

<u> APPROV</u>ED FOR RELEASE: 06/23/11: CIA-RDP86-005<u>13R001134700023-6</u>

The influence of the ...

8/608/88/03/31/31/32/8/32 0278/03/84

angle α . Haximum durability in obtained when they are even in Malue: $-C_f = \alpha$. It was also determined that, in addition, in the durability is obtained in proportion to the difference between the optimum angle C_f and the optimum rating angle C_{opt} . It was next determined that the width f must absolutely be contact with the plastic deformations on the cut in its zone of contact with the raking face, and best results are obtained if f = (2.0 - 2.0). (where g is the width of the cat); as the sone of plastic informations in the cut increases g th increases of the cut width, it is possible to perform larger widths of the bevel. This bevel (when and resistance to fragmentation of the edges. A rounding off of the tool tip was found to increase the durability of the tool in a contact vith the main contact angle g. In the length of the cattering edge in contact with the item material increases in ground to the rounding radius, thus increasing the opening probability main placing face of the tool and reducing the opening probability.

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8/USU/S2/3S3/3U1/37U/931 D272/D374

Popov, N., Mittaion, J. and Deciu, N. AUTHORE:

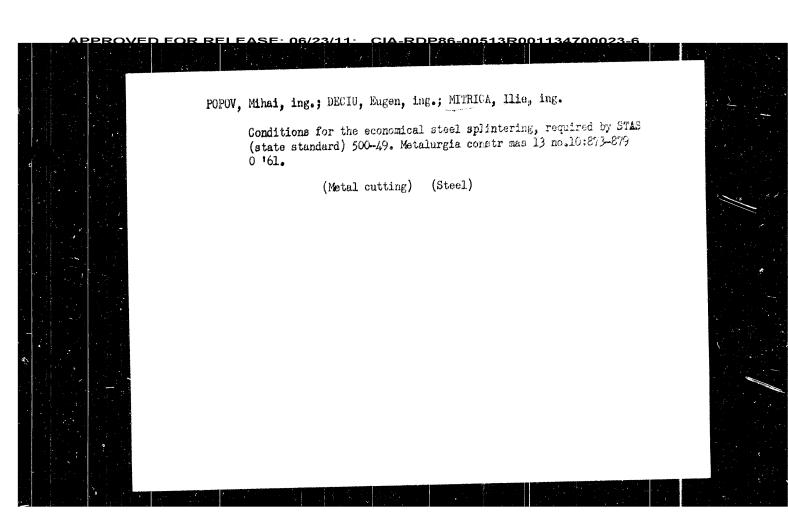
The influence of the bevel and the rosming radio upon the wear of the cutting took 11771:

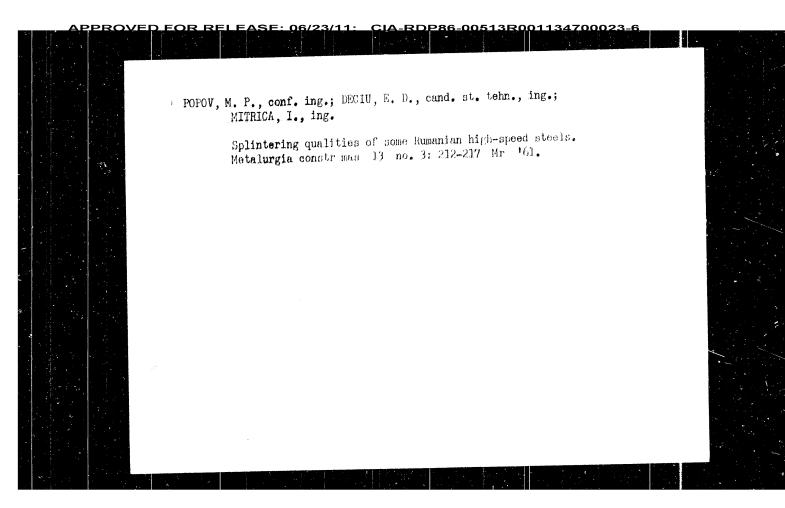
PERIODICAL: Mecanicá aplicatã, no. 1, 1962, 205-213

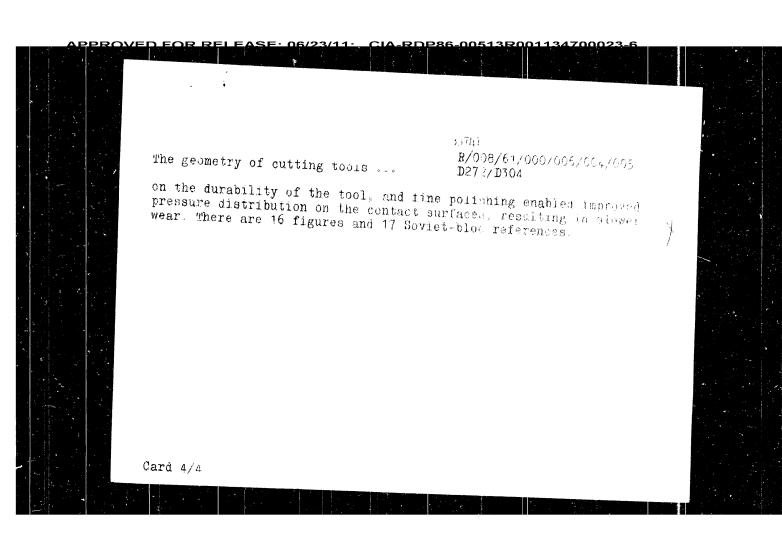
THEY: Results are given of research underwiker at the institutal de mecanica adjecta 'Traina Vuia' (Institute of Applied Mechanica 'Traina Vuia'). It was first determined that a bever face along the main edge of the lathe cutting tool can reduce tool wear considerably, if it is realized with consideration of its two parameters ably, if it is realized with consideration of the two parameters its width f and its angle of inclination Y. Examination of the equilibrium of the plastic deformations in the cutting some has indicated the existence of only one angle ζ_1 which readers a missel

durability; a theoretical, as well as practical, investigation has indicated a close connection between γ_1 and the principal placing

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3.741

The geometry of cutting tools

R/008/61/000/006/004/005 D272/D304

The latter formula is difficult to employ in practice and, therefore, the use of a table is suggested. Examination of the other cutting tool angles on nine steels of the above mentioned two cate gories indicated the following optimum values - $\alpha = 11^{\circ}$, $\alpha_1 = 15^{\circ}$ κ = 45°, κ_1 = 10°, $\lambda \approx$ 0. These values do not depend on the nature of the processed material in the case of the steels processed in this study. In the case of the main working angle there is no actual optimum value, as the tool durability is increased with the max. possible decrease of κ_{ν} thus choosing the minimum value of ν for each respective profile processed, as well as for each rigid ty of the processed item (higher rigidity enables smaller \mathcal{H}). It was also established that at appropriate hardnesses the material of cutting tool does not affect the optimum angles. At 0-15 HRC units the deformations of the tool do not differ appreciably, and the initial optimum contact surfaces do not modify and the wear will be the slowest, as was demonstrated on a series of metal carbides and mi neralo-ceramic materials. In addition to the size of the initial contact surface, its quality was found to have an appreciable effect Card 3/4

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The geometry of cutting tools

placing angles α and α_{1} , the main and secondary working angles \aleph and \aleph_{1} , and the inclination angle of the main cutting edge k. A close relationship was found between the wear and the geometry of the 3 active faces, determining that the optimum contact surfaces which are defined as the initial surfaces corresponding to the optimum angles — correspond to a distribution of the specific pressures resulting in the slowest destruction of the active faces. The front rake angle was found to depend on the intensity of the deformations originating in the cutting zone of the processed wear thus a different front rake angle must be chosen for each type of steel processed if an optimum initial contact surface is desired. This is born out by empirical formulas (function of the ultimate tensile strength and function of the Brinell hardness). As the hardness depends on the carbon content it was possible to derive the dependence of the rake angle on the carbon content

 $\gamma = 71.43 \log \frac{0.805}{C + 0.278}$

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33745 R/008/61/000/006/004/005 D272/D304

AUTHORS:

Popov, M.P., Mitrica, I., and Declu, E.D.

TITLE:

The geometry of cutting tools for carpon steel

processing

PERIODICAL:

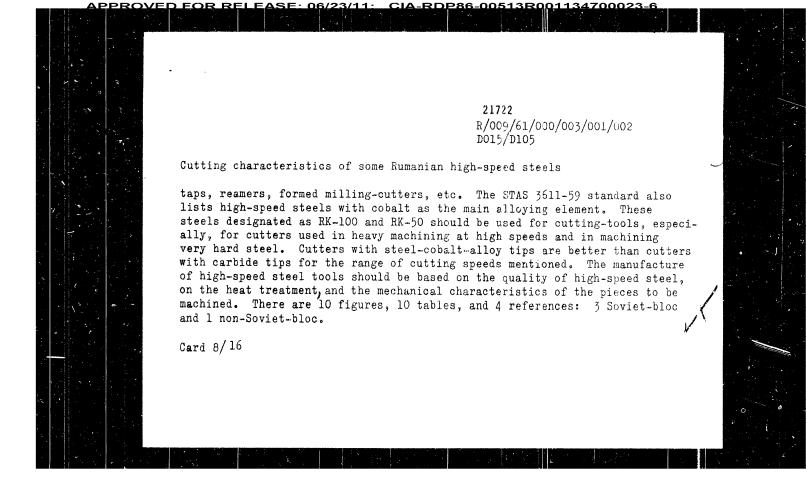
Studia si cercetăra de mecanacă aplacata, no. 6.

1961, 1357 - 1378

TEXT: The problem of the geometry of the turning cutting tool for processing ordinary heat treated carbon steels (STAS 500-49) and neat treated quality carbon steels (STAS 880-49) has been investigated in a series of tests performed at the "Institutual de mecanica applicata - Traian Vuia" (Institute of Applied Mechanics) - Traian Vuia. The study is based on the evolution of wear with time applied to the ceiling of wear δ_{α_1} = 1 mm on the secondary placing face.

the results being presented by means of the correction coefficients of the durability — τ — which are dimensionless. The study was concentrated on the main angles of the active part of the turning but ting tool, namely the front rake angle γ , the main and secondary

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Cutting characteristics of some Rumanian high-speed steels

show that lathe cutting tools made from RMo-50 steel make for higher economical speeds. A comparative analysis can also be made by using the $K_{\overline{m}}$ coefficient defined as

$$K_{\rm m} = \frac{v_{60} RMo - 50}{v_{60} RW - 180}$$
 (5)

This shows that RW-180 tools are recommended for K $_{\rm m}$ 1 and RMo-50 tools for K $_{\rm m}$ 1. The results obtained by the I.M.A. laboratory were confirmed at the industrial level at the "23 August" Plant which tested many types of tools. The results proved that RMo-50 steel is cheaper than RW-180. Therefore, RMo-50 should be used for general purposes, such as lathe cutters, planing cutters, slotting cutters, milling cutters, etc. The RW-180 steel is recommended for tools which produce small chips, such as twist drills, screw-

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Cutting characteristics of some Rumanian high-speed steels

sharpening, $K_3 > 1$. By performing a groove and a chamfer on the main cutting edge, an increase of the economical speed was obtained, i.e. $K_3 > 1$. The values of the K_T coefficient are given in Table 4 and the values of the speed correction coefficients in relation to geometric parameters in Tables 5 to 9. The power required for the cutting process was determined from:

$$N=C_2t^{x_{\S}} \cdot s^{y_{\S}} v^2$$
 (4)

where N is the cutting power in kw; C_2 , constant in relation to the machined material and other parameters included in K, and x_1 , y_1 , z, exponents in relation to the machined material. Experimental numerical values from this equation are given in Table 10 showing that the values for tools made from the 2 types of high-speed steels; did not differ appreciably. Fig. 7 and 8

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Cutting characteristics of some Rumanian high-speed steels

where K_1 is the correction coefficient in relation to the mechanical properties of the machined material; K_2 , correction coefficient in relation to the cooling system used; K_3 , correction coefficient of the cutter in relation to the sharpening method; K_4 , correction coefficient in relation to the homogeneity of the material, the presence of slag, etc. resulting from cold drawing; $K_{\mathbf{T}}$, correction coefficient in relation to the economical tool life; $K_{\mathbf{m}}$, correction coefficient in relation to the material of the cutter; and $K_{\mathbf{T}}$, $K_{\mathbf{d}}$, $K_{$

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R/009/61/000/003/001/002 D015/D105

Cutting characteristics of some Rumanian high-speed steels

different conditions are used for determining the speed-correction coefficients. The economical cutting speed is calculated from the formula

$$\mathbf{v}_{\mathrm{T}} = \frac{\mathbf{c}}{\mathbf{t}^{\mathrm{X}} \cdot \mathbf{s}^{\mathrm{Y}}} \cdot \mathbf{K} \tag{2}$$

where ${\bf v}_{\rm T}$ is the cutting speed for the economical tool life T of the cutter in m/min; t, cutting depth in mm; s, feed in mm/revolution; C, constant in relation to the machined material; x and y, exponents in relation to the machined material and K, overall correction coefficient of the speed. The numerical values obtained are shown in Table 3 and are used in Eq. (2) for calculating the economical speed ${\bf v}_{60}$ for s = 0.1 - 1 mm/revolution and t = 0.5 - 6 mm.

The overall correction coefficient of cutting speed is expressed by:

$$K = K_{1} \cdot K_{2} \cdot K_{3} \cdot K_{4} \cdot K_{T} \cdot K_{m} \cdot K_{r} \cdot K_{d} \cdot K_{d} \cdot K_{r} \cdot K_{r} \cdot K_{r} \cdot K_{r}$$
(3)

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21**722** R/009/61/000/003/001/002 D015/D105

Cutting characteristics of some Rumanian high-speed steels

aschierii metalelor în R.P.R., Metalurgia și Construcția de Mașini XI, (1959), nr. 10, pag. 875-877). The optimum values of the side rake angles Y; side clearance angles α ; front clearance angles α ; secondary adjusting angles X, and back rake angles λ were determined on the basis of geometrical parameters and are given in Table 1. They are also valid for tools made from RW-180 and RMo-50 steels. The numerical values of the relation between cutting speed and tool life were established by the equation

$$vT^{n} - C_{1}$$
 (1)

where v is the cutting speed in m/min and T, tool life in min. The variation of the relation between cutting speeds and tool life when cutting 35MoCN 20 steel with an RW-180 cutter is shown in Fig. 1 and when cutting 0L-38 steel with an RMo-50 cutter in Fig. 2. The interpretation of these values shows that the exponent n is independent of speed, feed and cutting depth. The n walues given in Table 2 calculated as an average of values obtained under

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21**722** R/009/61/000/003/001/002 D015/D105

Cutting characteristics of some Rumanian high-speed steels

jected to heat treatment at the Uzinele "23 August" (Plant) in Bucharest. The RV-180 steel is composed of 0.76% C; 4% Cr; 19% W; 0.15% Mo and 1% V. The RMo-50 steel is a new product of the plant having molybdenum as the main alloying element and consisting of 0.84%C; 4.1% Cr; 5.4% W; 5% Mo and 1.64% V. The tool hardness was 63-65 Rc. The tools were sharpened by subjecting them to a roughing and a finishing operation. Rough grinding was carried out with artificial corundum with a ceramic bond having a J-K hardness and a 36-60 granulation. The finishing was carried out with silicon carbide with a ceramic bond having a K hardness and a 60 granulation. The tools had no groove or chamfer. The experiments with tools from RW-180 and RMo-50 steels were conducted on OL-38 carbon steel according to STAS 500-49 and on 35 MoCN 20 alloy steel. The samples made of OL-38 steel had $\delta_{\kappa} = 39-46 \text{ kgf/sq mm}$. The analysis of 35 MoCN 20 steel samples showed the following composition: 0.36-0.39% C; 0.66-0.67% Mn; 0.70-0.80% Cr; 0.18-0.22% Mo; 1.80-1.90% Ni and $\boldsymbol{\delta}_{r}$ = 67-73 kgf/sq mm. The experiments were carried out on cutting operation parameters as given by M. Popov, I. Mitrică, E. Deciu (Ref. 2: Aspecte ale cercetării științifice în domeniul

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AUTHORS

Popov, M.P., Engineer, Instructor; Deciu, E. D., Engineer, Can-

didate of Technical Sciences, and Mitrica, I., Engineer

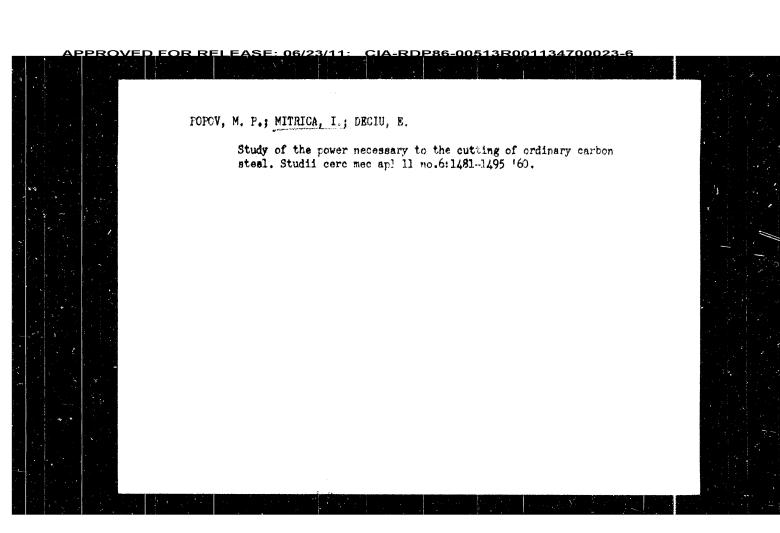
TITLE:

Cutting characteristics of some Rumanian high-speed steels

PERIODICAL: Metalurgia și Construcția de Mașini, no. 3, 1961, 212-217

TEXT: The article deals with Rumanian standardized alloy steels used in tool making, and, in the light of recent specified requirements listed under STAS 3611-59, reviews problems and general conditions of domestic high-speed steels by analyzing and computing their cutting characteristics. The Institutul de Mecanica Aplicata "Traian Vuia" ("Traian Vuia" Institute of Applied Mechanics) of the Rumanian Academy conducted experiments on cutting operations using a lathe equipped with Rumanian high-speed-steel cutting-tools which were studied by M. Popov, I. Mitrica and E. Deciu (Ref. 1: Studii acupra parametrilor aschierii cu cutite de strung din otel rapid romînesc. Studii şi cercetări de Mecanica Aplicata, X (1959), no. 2, pag. 539-564). The materials used in the tools were RW-180 and RMo-50 high-speed steels both manufactured and sub-

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Use of Metal-Ceramic Tips in Lathe Mork

R/009/60/000/000/003/668

plying a 0.2 mm wide chamfer along the cutting edge, using a better Shark, Improving the tip quality, etc. There are 5 figures, 3 tables, 1 photograph and 6 references: 2 Rumanian, 1 Soviet, 2 Prench and 1 dermun.

ASSOCIATION: Sectla de magini si mecanisme. Institutul de mecanicà "fraian Vala" (Section of Machines and Mechanisms. Institute of Applied Mechanic:

"Traian Vaia")

Card 3/3

Use of Metal-Ceramic Tips in Lathe Work

R/009/60/000/009/003/008 A125/A026

5 and 6). Subject article contains a part of the constusions being of immediate importance to those who work with such tips. The plastic and elastic deformations occuring in the detaching zone of the shavings are very favorable. Thus, the number optimum geometry has been obtained with the ENC1 tip having a hardness of $HR_0 = 60$ - 74 as with carbide tipped tools, when machining the same steel. The point of the tool was $r \approx 0.5$. The deviations from the optimum values of the cutting edge angles should not exceed \$ 10. Because of the initial shape of the MMC1 tips, experiments with an end clearance $x = 45^{\circ}$ could be accomplished. Regarding the optimum machining conditions, a greater dispersion of results could be established with ENC₁ tips than with carbide tip. The economic cutting speed can be computed $\frac{v_T}{\sqrt{x}} = \frac{c}{\sqrt{x}} \times \frac{c}{y} \times \frac{c}{y}$ (2)

$$v_{T} = \frac{\sqrt{x + y}}{C} K \tag{5}$$

in which v_T = economic speed for a durability of T, in m/mm; t = cutting depth in mm; s = feed in mm/rev; $K = the overall correction factors. The useful power consumed can be computed with the formula <math>N = C_2 t^{X_1} s^{Y_1} v^2$ (kw). (3). The results obtained in machining "OL 60" and "OL 70" steels with ENC; tips are slightly recombined the results obtained with S_1 and I_{15} K_6 carbide tips, but are comparable with the results obtained with S_3 and F_5 K_{10} carbide tips. The results can be improved by lapping the tips, by using tool points with a greater radius for to 2 mm. lapping the tips, by using tool points with a greater radius (up to 2 mm) by ac

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R/009/60/000/009/003/008 A125/A026

AUTHORS:

Popov, Mihail, Paul, Lecturer, Engineer, Candidate of Technical Sciences, Chief of Laboratory; Deciu. Bug., Engineer, Researcher,

Mitrica, Ilie, Engineer, Researcher

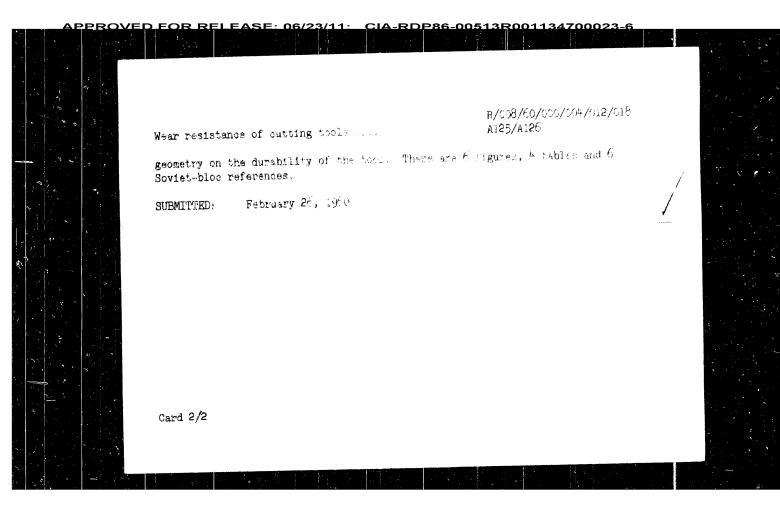
TITLE:

Use of Metal-Ceramic Tips in Lathe Work

PERIODICAL:

Metalurgia și Construcția de Mașini, 1960, No. 9. pp. 796 - 201

Vestigations conducted in many countries. Brief reference is made to the composition of metal-ceramic tips, their grinding and fastering to the snank. Isayevation of metal-ceramic tips, their grinding and fastering to the snank. Isayevation of metal-ceramic tips, their grinding and fastering to the snank. Isayevation and Kuchma (Ref. 1) have presented various possibilities of fastering metal-ceramic tips to the tool shank. The Bumanian INCERC has developed a metal-ceramic tip named ENC, which revealed good results. Experiments with ENC; tips requested the optimize geometric elements, the test machining conditions, etc., have been not ducted in the Laboratory of the Institutual de Mecanică Aplicată "fratam Vuia" tips stitute of Applied Mechanics "Tratam Vuia") of the Academia R.F.R. (Bumaniam Academy), in cooperation with Engineer M. Calciu, The experiments have been conducted on "OL 60" and "OL 70" steels (SIAS 500-49) in accordance with methods used at carbide tipped tools. The results have been presented in two previous papers (Refs. Card 1/3)



B/008/60/000/004/012/018 A125/A126

AUTHORS:

Popov, M. P., Midrica, I., and Desiu, E.

TITLE:

Wear resistance of outling tools in function of their geometrical

parameters

PERIODICAL:

Studii și Carsetári de Mecanică Aplicată, no. 4., 1960, 983 - 995

TEXT: Soviet workers, e.g., Bykov, Berkevick, and Kolesov, have developed excellent outling tool geometries, matching the requirements of a high-speed outling process. The chemical composition of the steel is very important for the determination of the machining ability. Starting from the development in the use of a outling tool, the authors examine and determine the optimum geometric parameters in case of the machining of parts rade of conventional, heat-treated carbon steels (STAS 500-59). The obtained relations furnish the connection between the geometrical parameter values and the machanical characteristics, or, rather, the carbon contents of the steels submitted to the tests. Further, the authors examins the influence of the deviations from the optimum

Card 1/2

Aspects of the scientific research in the field of metal entting in Eumania r.E75

METALURGIA SI CONSTRUCTA DE MASSETI. (Ministerul industrici Metalurpice si Constructiilor de Masins si asceiatia Stintifica x Inginerilor Si Technicientilor din Reginiu) Decuresti, Remania Vol.11, nc.10 Oct. 1949

Monthly list of Fast European Accessions (E.AI) LS, Vol.0, nc.2 Feb. 1969

Uncl.

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-005/13R00/1134700023-6

ATTRICA, I., DECIV. E.; W.CV. A.

Centralizing installation of measurement systems for the study of cutting machines and tools. 9.923

ATUDIT SI CENCETARY BE MECHA ON WELIGHTS. Academia Republicit Regulare Remains Bucuresti, Rumania Vol. 10, no.3, 1959

Renthly List of East European Accessions (EAT) 10., Vol. 3, no.2, Jan. 1963
Uncl.

80419 RUM/8-59-1-14/24

On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips ${}^{\circ}$

ceramic tips because of their properties, but can be reduced by choosing a respective variation of the cutting parameters. Optimum working conditions with immediate practical use can be established for both types of tips. The wear of "ENC1" mineral ceramic tips, increases faster than that of "S1" steel tips, which leads to a reduction of the accuracy during long time machining. Based on this article the authors conclude that tools with steel tips could at least partially be replaced by tools with mineral

ceramic tips.
There are: 14 graphs, 3 tables and 9 references, 4 of which are Rumanian,

3 Russian and 2 French.

SUBMITTED:

July 7 , 1958

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80419

RUM/8-59-1-14/24

On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

$$Nv_{60} = 3.58 s^{0.70} t^{0.76}$$
, (17),

$$Nv_{60} = 3.49 \text{ s}^{0.25} \text{ t}^{0.57}$$
, (18)

$$Nv_{60} = 3.58 \text{ s}^{0.70} \text{ t}^{0.76}, \qquad (17),$$
in case of "OL-60" steel machined with ENC₁ tip;
$$Nv_{60} = 3.49 \text{ s}^{0.25} \text{ t}^{0.57}, \qquad (18)$$
in case of "OL-70" steel machined with S₁ tip; and
$$Nv_{60} = 2.96 \text{ s}^{0.57} \text{ t}^{0.59}, \qquad (19),$$
in case of "OL-70" steel

in case of "OL-70" steel machined with ENC_1 tip. In case of using nomograms, the respective K_1 speed correction coefficients have to be used if not all conditions are matched. Following the presented results based on approximately 4,000 experimental determinations made with two types of steel, the authors have drawn the following conclusions on the behavior of mineral ceramic tips, compared with steel tips: The hardness variation curves in function of the speed or cutting depth show the same behavior with both types of tips. The hardness variation law in function of the cutting speed keeps the same shape independently from the type of tip used. The general formulae (Nr 4 and 11) of the optimum cutting speed and of the consumed effective power of steel tips can also be extended upon the mineral

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80419 RUM/8-59-1-14/24 On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and in case of "OL-60" steel machined with S1 tip; in case of "OL-70" steel machined with S_1 tip; (13).in case of "OL-60" steel machined with ENC₁ tip; $N = 0.0387 t^{0.93} s^{0.96} v,$ $N = 0.0387 t^{0.89} s^{0.84} v,$ (14),in case of "OL-70" steel machined with ${\tt ENC}_{\tt l}$ tip. A comparing of the (15), consumed effective power in case of the machining of the same steel but with different tips, is presented by (Figure 10). All tips (S_1 and ENC_1) had a wear of: $\delta\alpha_1 < 0.4$ mm. Inserting the expressions of the optimum speeds given by the relations (Nr 7, 8, 9, 10) into the formulae of the effective power (Nr 12, 13, 14, 15), the authors have obtained the expressions of the optimum of of the opti pressions of the effective power in case of machining with the optimum $Nv_{60} = 3.78 \text{ s}^{0.35} \text{ t}^{0.72}$ Card 7/9 in case of "OL-60" steel machined with S_1 tip; (16),

80419 RUM/8-59-1-14/24 On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and

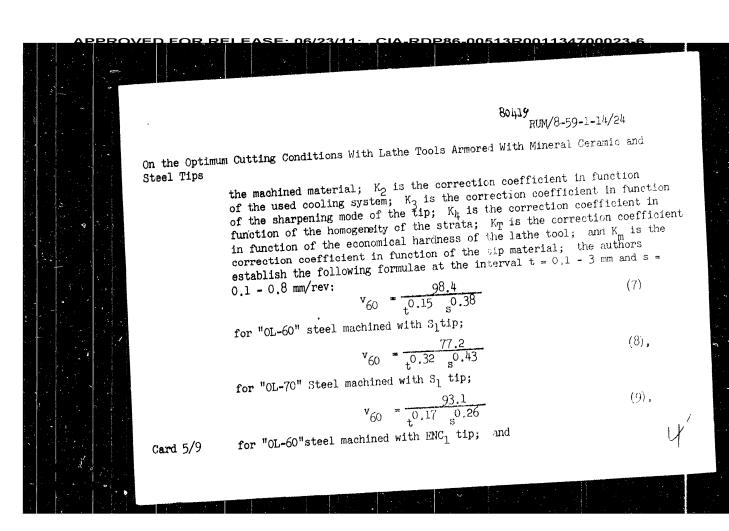
$$v_{60} = \frac{76.6}{t^{0.30} s^{0.27}}$$
 (10)

for "OL-70" steel machined with ENC, tip. To facilitate the calculations, the formulae (Nr 7, 8, 9, 10) can be represented by nomograms [Ref 3]. The optimum cutting speed of ENC₁ tips are lower than of S₁ tips. A comparing nomogram concerning only the feed is represented by (Figure 9). d) Influence of the cutting parameters on the effective power. Formulae for the determination of the machining power: Based on a general formula which comprises the influence of the different parameters of the optimum cutting

 $N = c_2 t^{x1} s^{y1} v^z$

In which N is the effective cutting power, kw; C_2 is the constant, in function of the machined material and other parameters comprised in the overall correction coefficient K; t is the cutting depth, mm; s is the tool feed, nm/rev; v is the machining speed, m/mm; x_1 , y_1 , z are the exponents in function of the machined material, the authors have determined the following formulae of the consumed effective cutting power: $N = 0.0384 t^{0.87} s^{0.73} v,$

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80113 RUM/8-59-1-14/24 On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and with ENC, tips, the maximum error appears at the K T coefficient if $T=-5^{\circ}$. The maximum error of the adimensional correction coefficients Steel Tips is smaller than that of the "n" exponent. The value of the nondimensional correction coefficients of the speed can be computed with an admissible error. c) Influence of feed and cutting depth on the speed; formulae for optimum economic speeds: Starting with the cutting speed formula: $v_{T} = \frac{c}{t^{X} s^{Y}} K, \qquad (4),$ in which v_{T} is the optimum cutting speed for an economical hardness T of the tool, m/min; t is the cutting depth, nm; s is the tool feed, mm/rev; C is the constant in function of the machined material; x and y are the exponents in function of the machined material; K is the overall correction coefficient of the speed, which has the following shape $K = K_1, K_2, K_3, K_4, K_T, K_m, K_7, K_{\alpha}, K_{\alpha}, K_{\alpha', 1}, K_{\chi'}, K_{\chi 1}, K_{\lambda}$ in which K_7 , $K_{\alpha l}$, $K_{\alpha l}$, $K_{x l}$, $K_{\lambda l}$ are the geometrical correction coefficients in function of the angles f, α , α_1 , α_1 , α_2 , α_3 , α_4 , α_5 , α_6 , α_1 , α_2 , α_3 , α_6 , α_6 , α_8 , α Card 4/9

-RDP86-00513R001134700023-6

8041 RUM/8-59-1-14/24

On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

shows that "n" depends from the processed material and the type of tip used. This maximum deviation Δn_{max} of "n" against the average are given by Table 2. The effects of these deviations are reduced. For the determination of the correction coefficient K_T of the economical speed in function of the hardness, the following relation is used [Ref 3]:

$$K_{\mathbf{T}} = \frac{v_{\mathbf{T}}}{v_{60}} = \left(\frac{60}{\mathbf{T}}\right)^{n}, \qquad (2),$$

in which $\mathbf{v_T}$ is the cutting speed for a hardness of T, m/min and $\mathbf{v_{60}}$ the cutting speed for a hardness of 60 min, m/min. The values of the $\mathbf{K_T}$ coefficients are given by Table 3. The adimensional correction coefficients are determined by using the relation:

KT = $(\tau_f)^n$, (3).

If for = 50 has the maximum error in case of "OL-60" steel, machined with S_1 tips. In case of machining "OL-60" steel with ENC₁ tips, the maximum error appears at the K_T coefficient if τ = -10°. In case of machining "OL-70" steel with S_1 tips, the K_T coefficient has the maximum error for a hardness of 120 minutes. Machining "OL-70" steel

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80419 RUM/8-59-1-14/24 On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips and d) Influence of the cutting parameters on the effective power. a) Influence of feed and cutting depth on the wear of the cutting tool: Many experiments have been conducted in order to study the influence of feed, maintaining a constant cutting speed and depth. The correlations T = f (s) are presented by (Figures 1 and 2). The study of the influence of the cutting depth was established in the same way, maintaining a constant cutting speed and feed. The results are given by (Figures 3 and 4). All curves presented by (Figures 1, 2, 3, 4) can be linearized in logarythmic coordinates. b) Influence of the speed on the wear of the cutting tool: The connection between the speed and the hardness of steel tips is expressed by the formula: This relation is valid for steel tips and mineral ceramic tips. Thus, the influence of feed and cutting depth can be neglected. The linearization of the experimental curves can be made in logarythmic coordinates in both cases. Some results with steel tips are expressed by (Figures 5 and 6) and with mineral ceramic tips by (Figures 7 and 8). The values of the "n" exponent in case of mineral ceramic tips are expressed by Table 1, which

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80419 RUM/8-59-1-14/24 25,7000 Deciu, E. Mitrică, AUTHORS: On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral TITLE: Ceramic and Steel Tips Studii si Cercetări de Mecanică Aplicată, 1959, Nr 1, pp 219 - 240 (RUM) PERIODICAL: A comparing study of lathe tools armored with mineral cerumic tips and steel tips has been previously accomplished [Ref 1], establishing the ABSTRACT: optimum geometrical parameters in case of machining "OL-70" and "OL-60" steels. Subject article presents experiments conducted with the same steels by using "ENC1" mineral ceramic tips (hardness: 65-74 HRC) made by the Institutul de cercetari stiintifice pentru constructii, materiale de constructii si industrializarea a lemnului (Institute for Scientific Research of Constructions, Construction Materials and Industrial Processing of Wood), and "S₁" steel tips (hardness: $70\text{-}78~\text{H}_{RC}$) made by Harith. Similar to the previous articles [Refs 1, 2, 3], this study is based on the tracing of the wearing off evolution. The following problems have been studied by the authors: a) Influence of feed and cutting depth on the wear of the cutting tool; b) Influence of the speed on the wear of the cutting tool; c) Influence of feed and cutting depth on the speed; Card 1/9

MITRICA, I.; DECTU, E.; FGECT, A. A comparative study of the geometric parameters of the autting tools fitted with mineral-ceramic plates and plates on the basis of metallic carbides. p.1077 STUDIT ST CERCETARY DE GEOLUGA APLICAVA. Academia Republicial logulare Romine Bucuresti, Rumania Vol. 9, no.4, 1958 Monthly List of East European Accessions (REAT) 10, V et. 9, no.1, Jan. 1960 Uncl.

MITRICA, I., POPOV, M., DECIU, E.

A boundary condition in the hydrodynamic analogy of lamination. p. 2339

Academia Republicii Fopulare Romine. Institutul de Mecanica Aplicata. STUDII SI CERCETARI DE MECANICA APLICATA. Bucuresti, Rumania, Vol. 8, No. 1, 1957

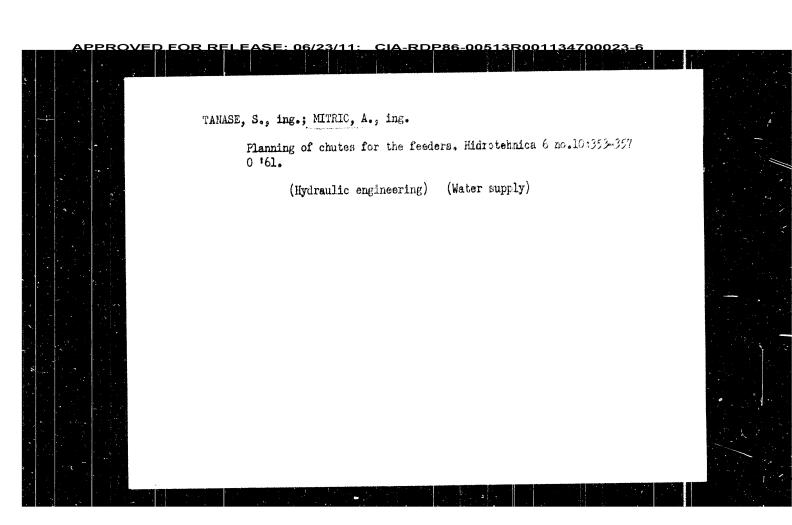
Monthly List of East European Accessions (EEAI) LC, Vol. 8, No. 8, Aug. 1959
Uncl.

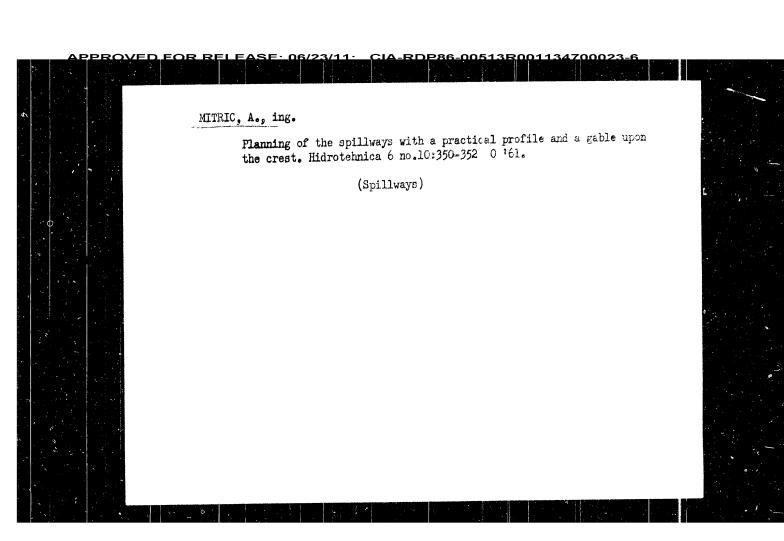
MITRICS, I.

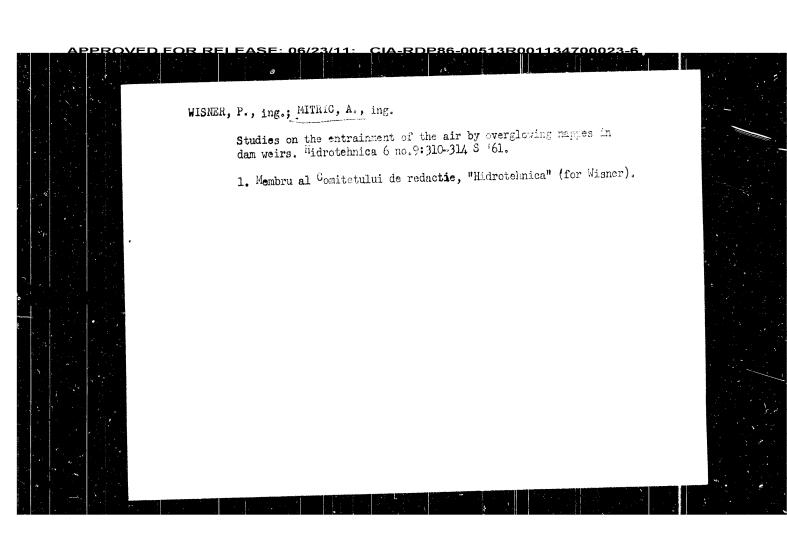
The study of specific pressures upon the contact surface in the laminatine process.

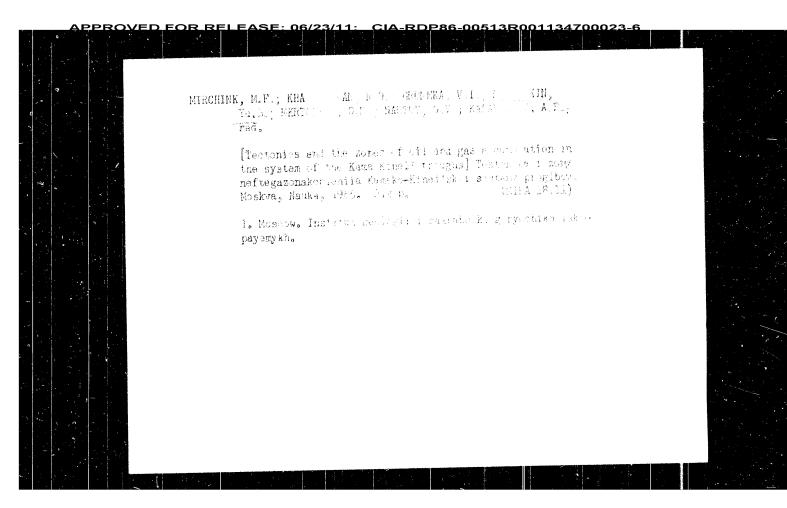
P. 557(Academia Republicia Populare Romina. Institutal de Fecanica Aplicata. S THE "I CERCETARI DE MECANICA APLICATA. No. 2, Apr./June "556. Duccresti, Rumenta)

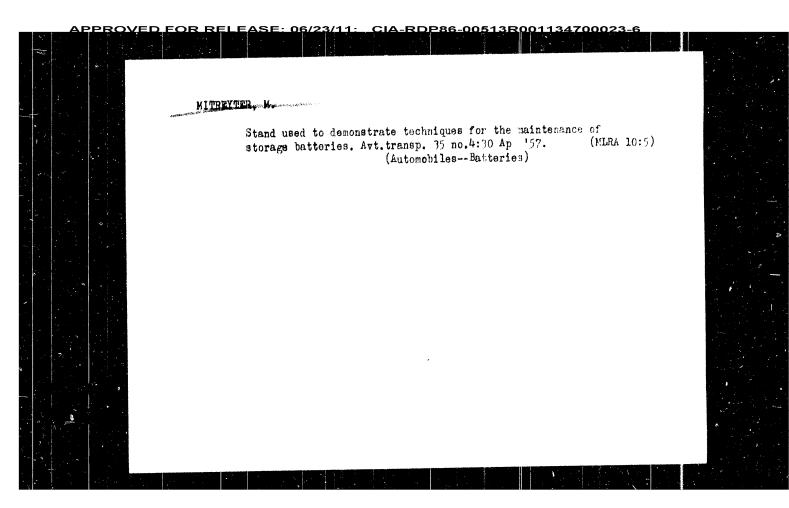
Honthly Index of Fast European Accessions (JEAI) 12. Vol. 7, no. 2, February 1958

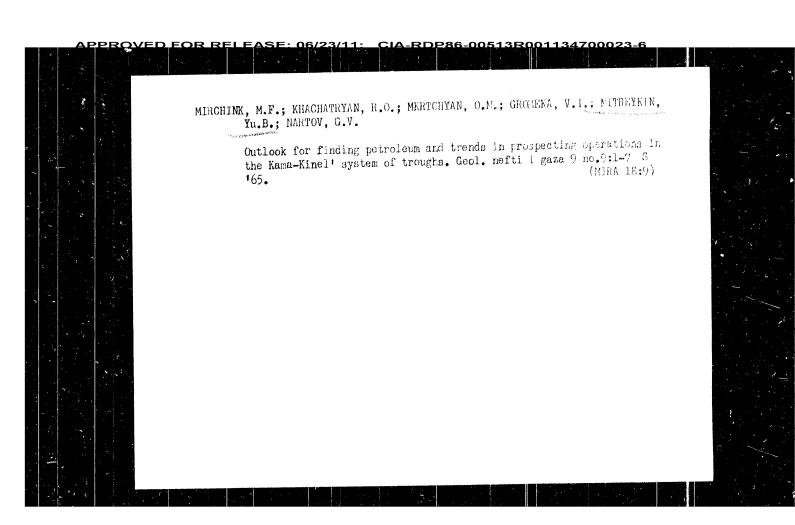


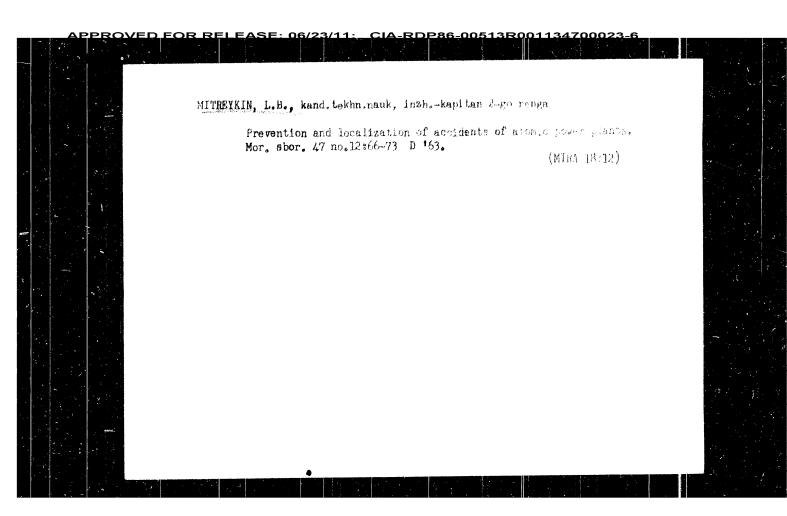












penetration this process differs favorably from the grinding process involving grinding disks having a ceramic base which evokes primarily tensile residual stresses in the product parts ground. Only during tape-frinding without cooling and in high-pressure operation do tensile residual stresses of the order of 10-20 kg/mm sites; but even then the depth of stress penetration does not exceed 15-10 \(\mu\); at greater depth compressive stresses prevail. The immediate objective should now be the development of a process for the making of high-grade watetressical now be the development of an order of 10-20 kg/mm of 10 cooling produces great difficulties in mass production. Another needed step is the standardization of abrasive tapes and the development of an All-Unjon Standard (COST) for the purpose of organizing a centralized production and supply of tapes (in a manner analogous to that of other types of cutting tools). There are 8 figures, 2 tables, and 6 Russian-language Soviet references.

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

The grinding of steels and heat-resistant . . .

\$/795/62/000/000/004/007

source of wear of the abrasive tape is the "self-grinding" of the abrasive layer by free grains, torn off - especially during the initial period of grinding - and pressed back against the tape by the surface of the product to be ground. It was determined that the heat developed in the actual cutting some reduces the strength of the adhesive hinder and increases its elasticity, whereupon the abrasive grains acquire an exceeding mobility and the cutting properties of the tape are impaired. Therefore, the use of cooling provisions in tape-type grinding machines is indispensable for the maintenance of a constant temperature of the lubricating liquid during grinding. The tape temperature appears to be an important factor in determining the effectiveness of the grinding process. The theory of the effect of tape tension requires substantial additional study. It is found that during less strenuous grinding operations the tape loses its frinding effectiveness through dulling of the grains, whereas during strenuous grinding operations the plastic binder deformation becomes so great that the losses of abrasive grains mount. The friction coefficient between the fabric base of the tape and the binder against steel was found to be of the order of 0.18-0.25, whereas the friction coefficient between the abrasive surface and steel is 0.45-0.75 (depending on the grain size of the abrasive); the respective friction coefficients with mineraloil lubrication are 15-20% lower. Tape grinding with cooling by mineral oil or an emulsion results in the formation in the surface layer of residual compressive stresses, both in the axial and in the tangential sense; in magnitude and in depth of

Card 2/3

\$/795/62/000/000/004/007

AUTHOR: Mitrevich, K.S.

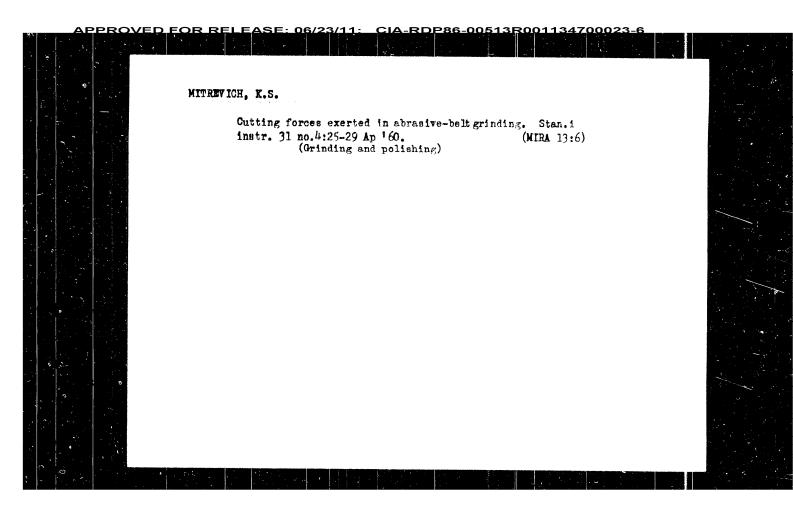
TITLE: The grinding of steels and heat-resistant alloys by means of abrasive

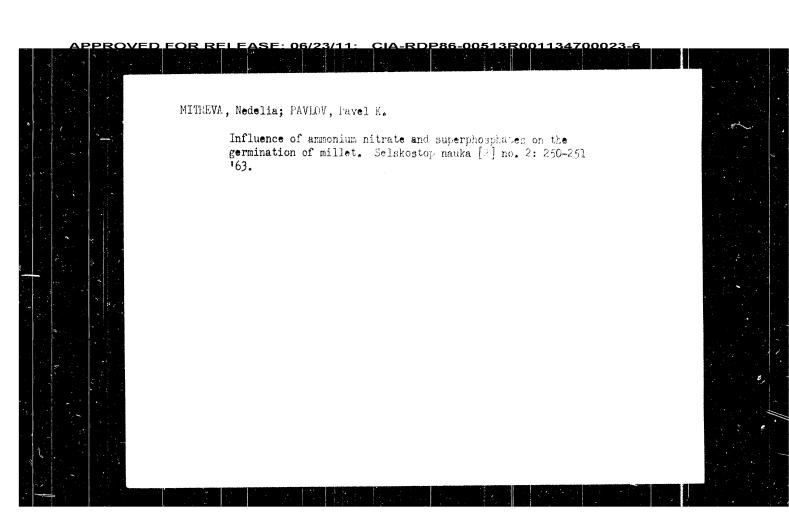
SOURCE: Vysokoproizvoditel'nove shlifovaniye, Ed. by Ye. N. Maslov, Kom. po tekh, mashinatr. In-t mashinoved. AN SSSR. Moscow, Izd-vo

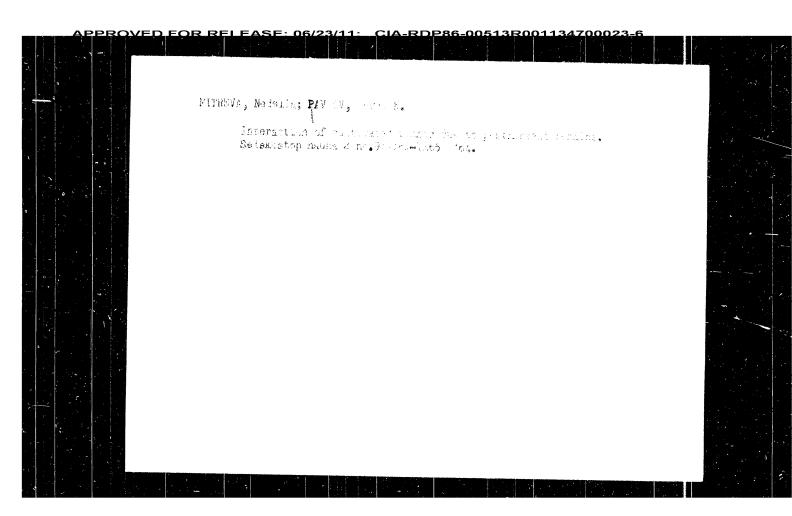
AN 585R, 1962, 149-161.

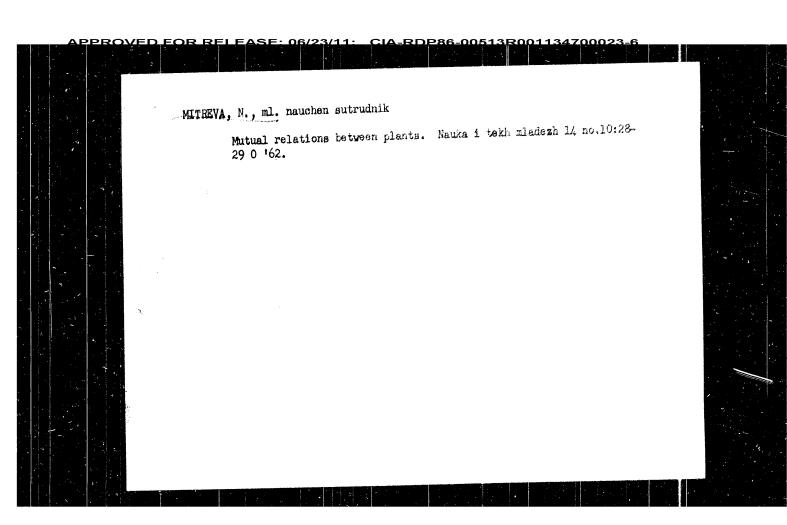
TEXT: The paper describes the results of an experimental investigation of the structural characteristics and the mechanical properties of abrasive tapes used in grinding; the specific objective of the investigation is a study of the effectiveness of the process of tape grinding and of the mechanism of the wear of abrasive tapes. The character of the strasses and deformations occurring in an abrasive-loaded tape in passing over an airfoil-like shape is snalyzed in detail, and it was found that the sources of the wear of an abrasive tape during grinding of metals appear to be the following: (a) The nonuniformity of the elastic and plastic deformation of the tape; (b) the failure of the abrasive grains under the influence of thermal stresses; (c) the wear of the grains under the effect of chemical actions; and (d) the sticking of metal particles ento the worn areas of the grains. An additional, transient,

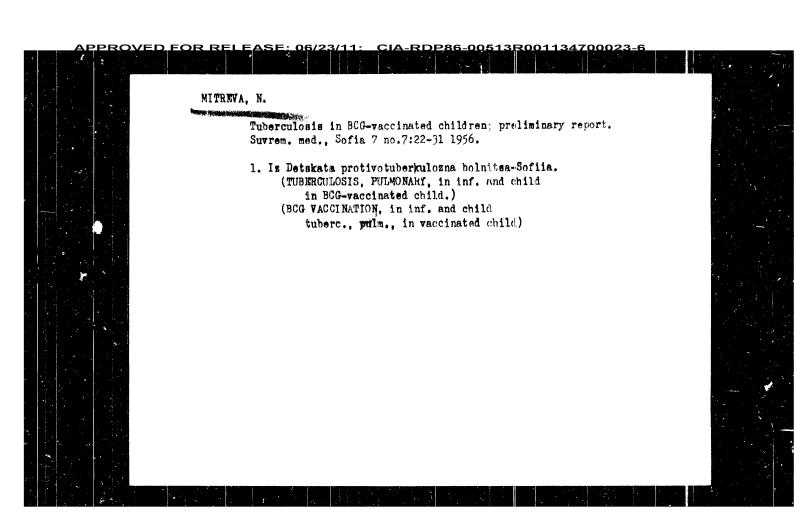
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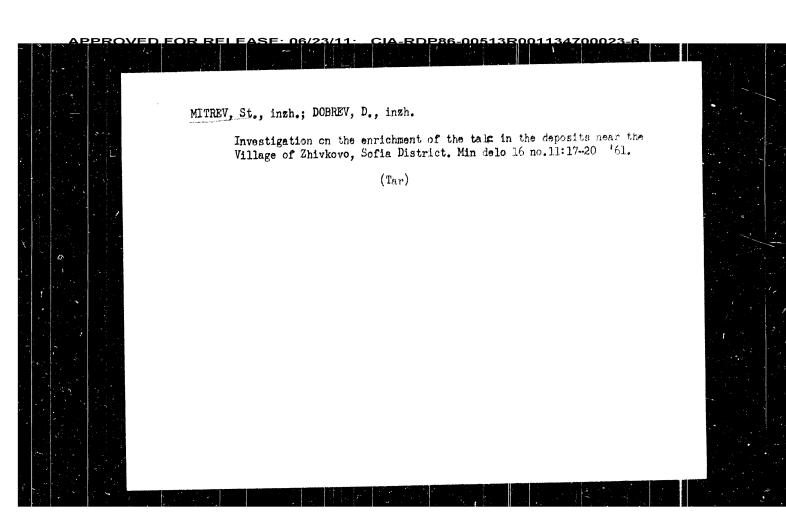


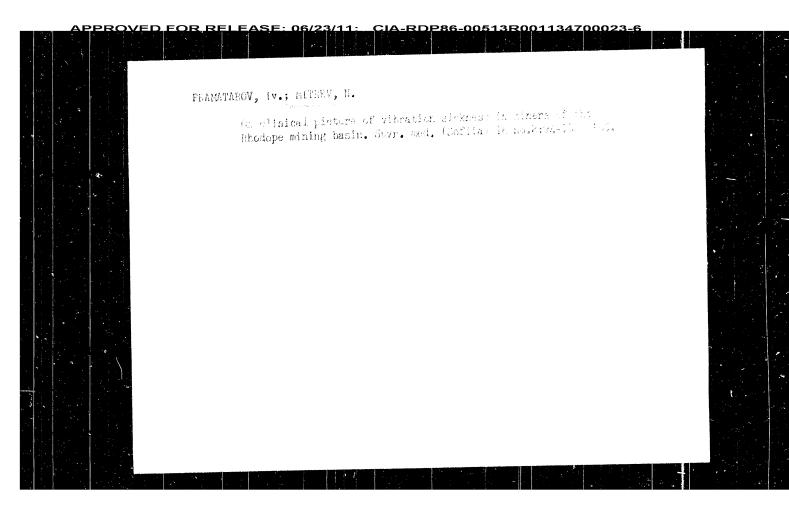


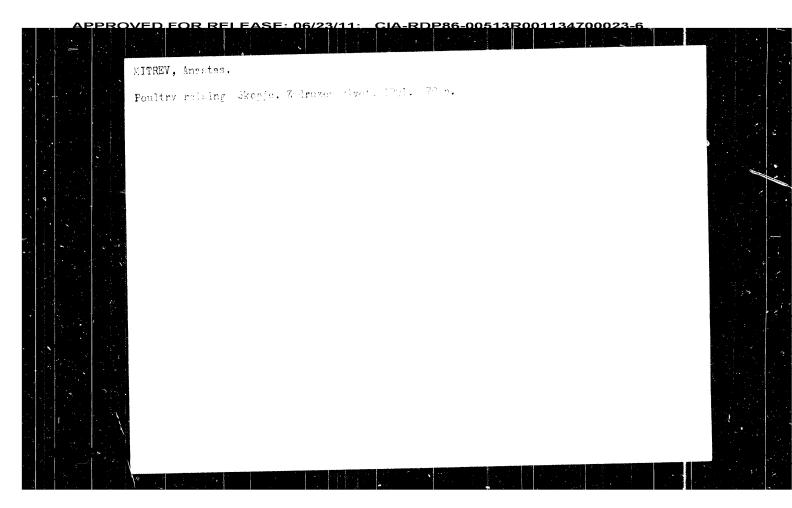










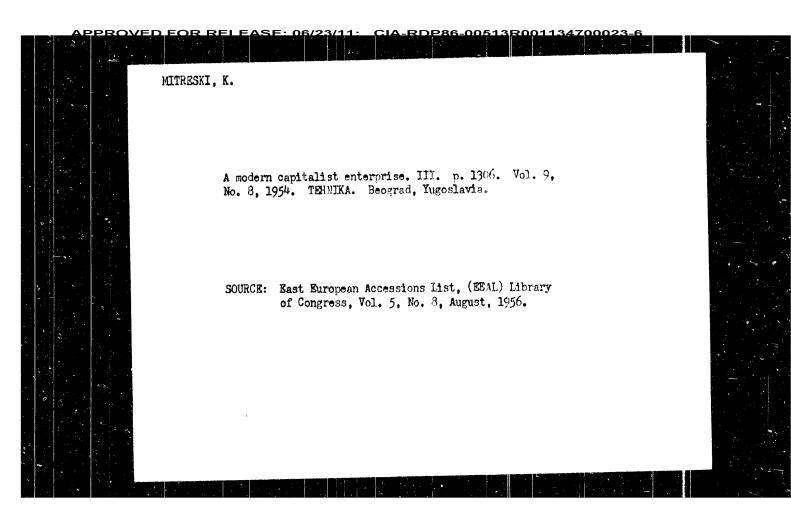


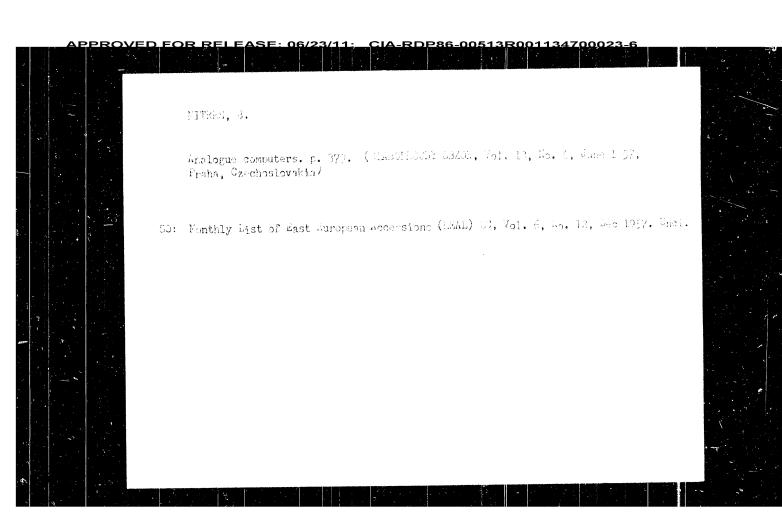
MITRESKI, K.

Organization of the work of workers' management. p. 1173

TEHNIKA, Beograd, Vol 10, No. 8, 1955

So: EEAL, Vol 5, Nol 7, July 1956





The Mechanism of Carrier Scattering in S/181/66/002/007/008/042 B006/B070

The authors thank I. V. Mochan for advice and discussions. There are 3 ASSOCIATION: Institut poluprovednikov AN SSSR heningrad (Institute of Semiconductors of the AS USSR, Lenngrad)

SUBMITTED: March 5, 1960

Card 4/4

825 33

The Mechanism of Carrier Scattering in p-Type Germanium

S/181/60/002/007/008/042 B006/B070

thermal vibrations (v_{th}) and ions (v_i) , a comparison of two samples with different hole concentrations may give v_i , mobilities u_{th} and u_i , where v_i = aN (a=sv, s being the mean ionic cross section, and v the mean hole velocity) and $\frac{1}{u_i} = \frac{m}{e}$ aN. Figs. 2 and 3 show the results of the calculations. Fig. 2 shows $\frac{1}{u} = f(lgT)$ for five samples, Fig. 3 shows $\Lambda(\frac{1}{u})$ for different pairs of samples. If formula (1), $1/u_{th} = 1/u + 1/u_i$ holds for the mobilities, the $T^{-2} \cdot 3$ law is obeyed for all samples. Summarizingly, it may be said that between 100 - 450°K v_i is independent of temperature (up to an accuracy of 10%), which diverges completely from the old theory. The mean free path of the carriers $(1 = \tau v)$ is therefore, proportional to v and not to v4, as was assumed earlier. Taking into account the scattering of holes by thermal lattice vibrations. the $T^{-2} \cdot 3$ law is well obeyed in the range of temperatures considered.

Card 3/4

The Mechanism of Carrier Scattering in p-Type Germanium

82533 S/181/60/002/007/008/042 B006/B070

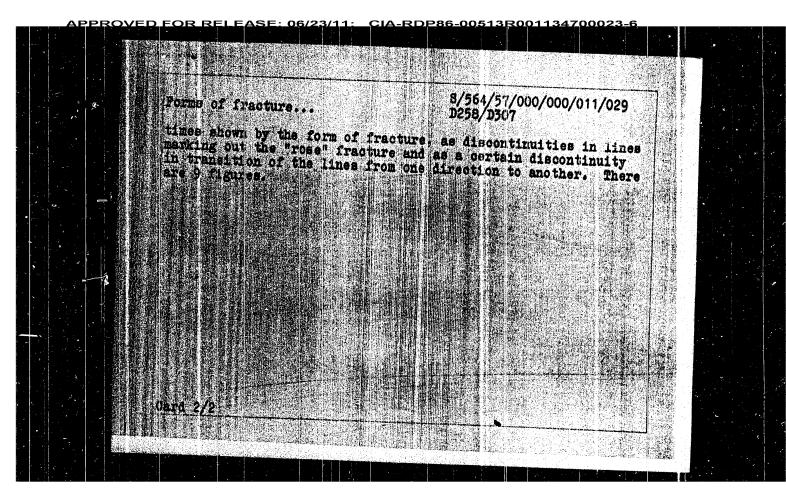
strongly doped samples. The authors used gallium-doped germanium with a hole concentration of $2.8 \cdot 10^{15}$ to 8.10^{16} . R was measured at 17.000 oe,

where $R\sigma = \frac{u_1p_1 + u_hp_h}{p_1 + p_h} = \tilde{u}$. The index 1 refers to light and h to heavy

holes. If it is assumed that the temperature dependence of the mobility of holes of both kinds is the same, $\tilde{u} * f(t)$ gives a correct description of the temperature dependence of the mobility of heavy holes. Fig. 1 shows u(T) on a logarithmic scale for five samples of germanium with different hole concentrations (curves 2-6). Curve 1 gives the straight line corresponding to the $T^{-2} \cdot \tilde{J}$ law. When the carrier concentration is increased, the slope of the curve approaches that of the straight line. Further investigations showed that the carriers of all samples are in a non-degenerate state at all temperatures. Lower values of the mobility in samples with high hole concentrations should, therefore, be explained as being due to the effect of a scattering from negatively charged acceptor ions whose number N is equal to the number of holes p. If it is assumed that the total number of collisions per second

card 2/4

MITRENING B.P 3/181/60/002/007/008/042 B006/B070 24.7700 Vinogradova, M. N., Golikova, O. A., Mitrenia, B. F., AUTHORS: Stilibans, L. S. The Mechanism of Carrier Scattering in p-Type Germanium TITLE: Fizika tverdogo tela, 1960, Vol. 2, No. 7, pp. 1428-1430 PERIODICAL: TEXT: It has been shown many times already that the temperature dependence of the hole mobility of germanium in the range $100-300^{\circ} K$ corresponds to the law $u \sim T^{-2 \cdot 3}$, and this contradicts the theory of carrier scattering on accustic vibrations. It was proposed to take into account also the optical vibrations to overcome this difficulty. If this is done, the mobility falls rapidly for T < 0, 0 being the Debye temperature. To check this hypothesis, u-measurements for T>0 can be made. To be able to determine u directly from conductivity and Hall constant R, the range of impurity conductivity on the side of high temperatures must be increased. This increase takes place in more Card 1/4



S/564/57/000/000/011/029
D256/D507

AUTHORS: Mitrenin, B. P., and Aleksandriya, B. V.

FITLE: Porms of fracture in germanium and silicon oryutals

SOURCE: Rost kristallov; doklady na Pervom soveshchanii po rostu kristallov, 1956 g. Moscow, Izd-vo AN SSSR, 1957, 170-173

FEXT: Ann. present work is a description of spherical forms of fracture observed at small and electron microscope magnifications. The fractures were made by moderately strong blows. The discussion is influenced by the work of D. B. Gogoberidae (Nekotoryve ob'yemnye defekty kristallov / Some volume defects of crystals / L., Isd. 16U, 1952, p. 1950, who classified fractures into bross' and wring types. The results are compared with the fracture of glass. Conclusions: The comboidal fractures in both 51 and 62 orystals follow largely the planes of cleavage, giving rise to steps 0.1 - 0.2 \(mu\) in height. Anisotropy is somewhard for the comboidal fracture in the comboidal fractu

137-1958-2-2762

Exploring the Possibility of Obtaining Homogeneous Germanium-Silicon (cont.)

Under a pressure of 3.5 tons/cm² the specimens were pressed from well mixed Ge and Si powders into the shape of rods having a cross-sectional area of $9 \times 9 \text{ mm}^2$ and a length of 95 mm; then they were sintered at 800° . Used in the experiments were a Ge with a resistivity of N l ohm/cm and an industrial Si that had been washed in acids. X-ray and microscopic studies of the resulting ingots revealed that, at a speed of travel of the band < 5-7 mm/hr, this system of band heating turned out a homogeneous Ge-in-Si solid solution (containing from 2 25 to 40 atom-percent in the form of polycrystalline ingots. To obtain a specimen of significant length of the uniformly constituted solid solution and to build up the grains of the alloy to 4-6 mm, the fusion zone had to be moved back and forth over the specimen several times at a speed of 5-7 mm/hr.

Yu.Sh

1. Germanium alloys-Formation 2. Geremics-ipplications

3. Alloys-Fusion 4. Ingots-Fest methods 5. Ingots-Fest results

Card 2/2

MITRENIA BP

137-1958-2-2762

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 79 (USSR)

Mitrenin, B. P., Troshin, N. Ye., Tsomaya, K.P., Vlasenko, V.A., AUTHORS: Gubanov, Yu.D.

Exploring the Possibility of Obtaining Homogeneous Germanium-Silicon Alloys Through a System of "Zonal Fusion" (Issledovaniye TITLE: vozmozhnosti polucheniya gomogennykh splavov germaniya s kremniyem s pomoshch yu zonnoy plavki)

PERIODICAL: V sb.: Vopr. metallurgii i fiz. poluprovodnikov. Moscow, AN SSSR, 1957, pp 59-69

A study was made of the feasibility of and the conditions under which homogeneous Ge-Si alloys could be obtained from ceramet ABSTRACT: billets of uniform composition (containing 5:25 atom-percent Si) through a system of "zonal fusion". The zonal fusion was accomplished in an apparatus consisting of a tube (15 mm in diameter) made from transparent quartz; the tube was connected through a pressure retaining lock to a vacuum (10⁻⁴ - 10⁻⁵ mm Hg). A graphite or quartz boat containing a specimen was placed in the tube. Traveling along the tube at a speed of 5-15 mm/hr was a Silit resistor. The length of the fusion zone was 15-20 mm.

Card 1/2

137-58-5 9456

Employment of Floating-zone (cont)

passes due to the growth within it of a film that screened the field. When an asbestos cylinder ~5 cm long was mounted on the tube for purposes of heat insulation in the vicinity of the inductor, checking and crumbling of the film diminished. The course of the melt was followed visually after the first pass and thereafter by instruments. Single crystals were obtained from the superheated zone after 4 to 7 passes when the rate of motion of the zone was 3-6 cm/hr. The employment of single-crystal seeding and rotation of the specimen facilitates production of single crystals. It was established that 6 to 8 passes of the zone make it possible to purify acid-washed Si until it is spectrally pure for 60-80% of the total length of the specimen, but the resistivity of the specimen rises little as this occurs, viz., from 0.05 to 0.08 ohm/cm. Floating zone refining of a specimen of Si with introduction of Ta 182 into the final zone makes it possible to purify the specimen of Ta to 10^{-5} - $10^{-8}\%$ after 1 to 7 passes of the zone. The Ta is concentrated in the final portion of the bar. The concentration of Fe⁵⁹ after the first pass drops to $10^{-4}\%$, and the Fe is concentrated in the final zone. Si iodide yielded single crystals that were chiefly of the p type and had a resistivity of 15-40 ohm/cm.

1. Single crystals--Growth 2. Single crystals--Gesinvivisy

3. Silicon iodide--Applications 4. Tantalum isotopes (Eurioactive) -- Applications

5. Iron isotopes (Radioactive) -- Applications Card 2/2

MITREMIN, B. P.

137-58-5-9456

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 5, p 92 (USSP)

Mitrenin, B.P., Lalykin, S.P., Savrasov, Yu.P., AUTHORS:

Radaykin, L.K.

Employment of Floating-zone Refining to Produce Single TITLE:

Crystals of Silicon (Primeneniye bestigel noy zonnoy plavki

dlya polucheniya monokristallov kremniya)

V sb.: Vopr. metallurgii i fiz. poluprovodnikov. Moscow, AN PERIODICAL:

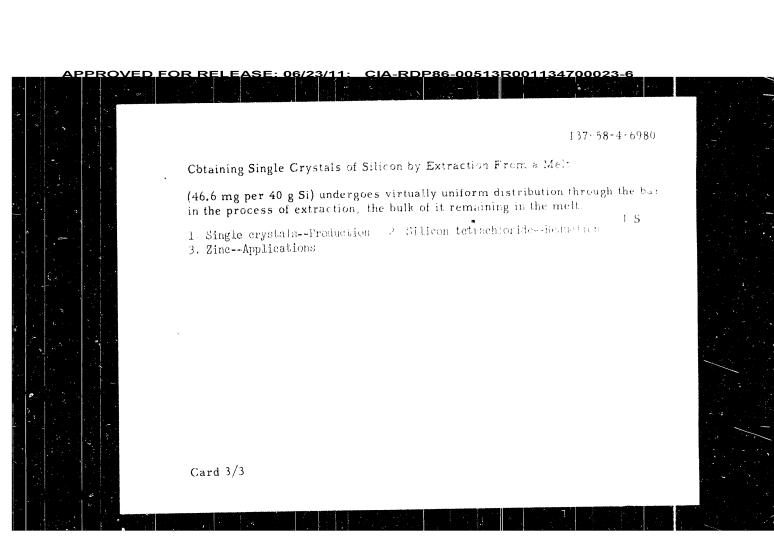
SSSR, 1957, pp 35-40

The melts were made in an apparatus consisting of a vertical ABSTRACT:

quartz tube (d=22 mm) in which a Si bar was placed vertically on two pins rotating at 1 to 50 rpm. The inductor (d=25 mm, height 4-6 mm) creating the zone was fed from a 5-kv generator working at 4 mc. The rate of motion of the bar relative to the inductor was 0.5-10 cm/hr. A vacuum of the order of 1-10⁻⁵ mm Hg was created in the quartz tube. The specimen was heated to 700°C by current passing through it. Elongated bars 15-20 cm long and 10-13 mm in cross section, and specimens of Si iodide in the

form of tubes 8-16 mm in diameter, filled with pieces of Si, were used for the melts. The quartz tube was replaced after 3 to 5

Card 1/2



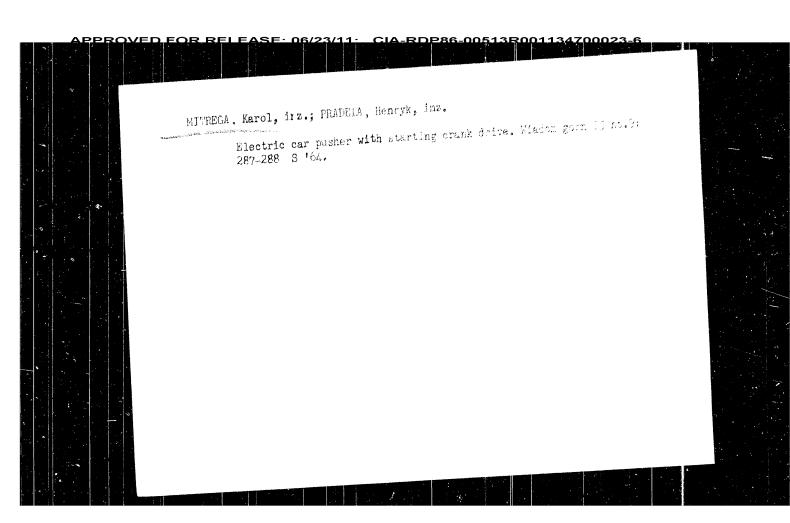
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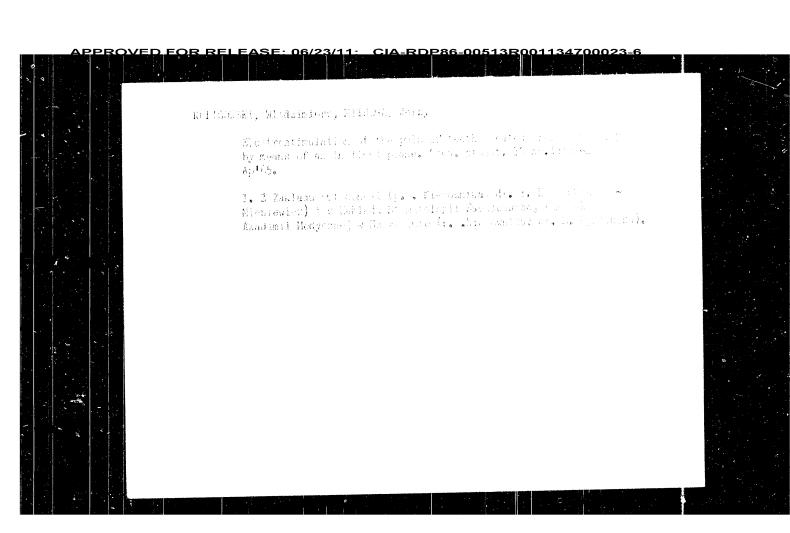
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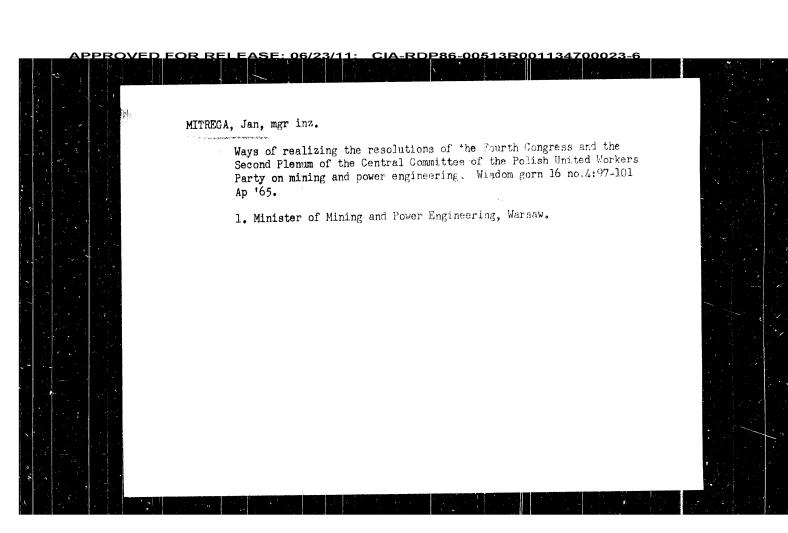
Obtaining Single Crystals of Silicon by Extraction From a Melt

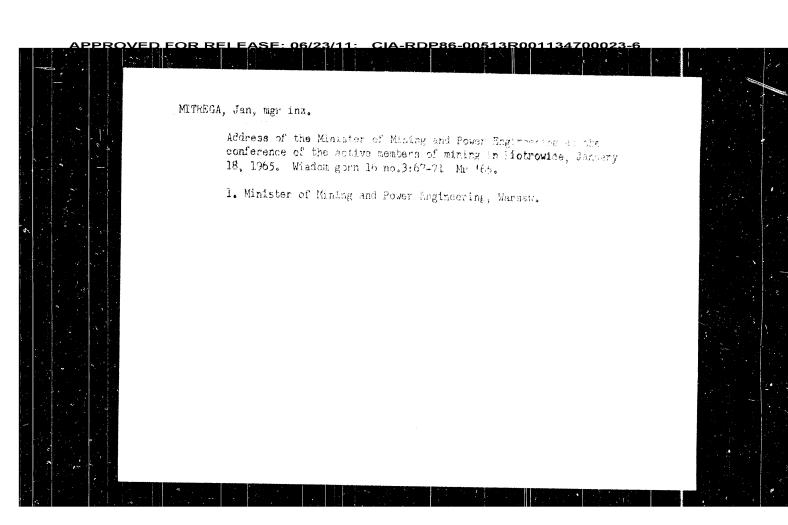
tion opposite to that of the rotation of the crucible at a rate of 2 rpm. The rate of extraction was 0.5-1 mm/min. It was established that when a slag film existed at the surface of the melt it was not possible to obtain any single crystals, as a number of small crystals appeared at points of accumulation of slag and at the point of inoculation. Repeated extractions after careful etching and upon removal of visible slag inclusions on the surface of the bar by emery and cutting away of its ends made it possible to obtain single crystals of 15-20 mm diameter and lengths up to 240 mm. Before pulling the crystal, the melt was held for 15-20 min at the pulling temperature in order for equilibrium to be established. The opinion is offered that the polycrystallinity of a drawn bar is also due to the formation of a film of SiO2 when the vacuum is reduced below 10^{-4} mm Hg, additional centers of crystallization being sct up thereby. One of the possible causes of further increase in vacuum is the reaction of quartz and graphite, and therefore the crucibles in the apparatus employed were placed so that they would touch the bases only at three points. It was observed that vibration of the apparatus facilitated twinning in the single crystal being grown. Radioactive isotopes made it possible to determine that Sb and Ag (respectively 1.5 and 6.1 mg per 40 g Si) were completely distilled from the melt and were not to be found in the crystal. Ta (12.5 mg per 40 g Si) remained in its entirety in the zone, and was the last to solidity, while Fe Card 2/3

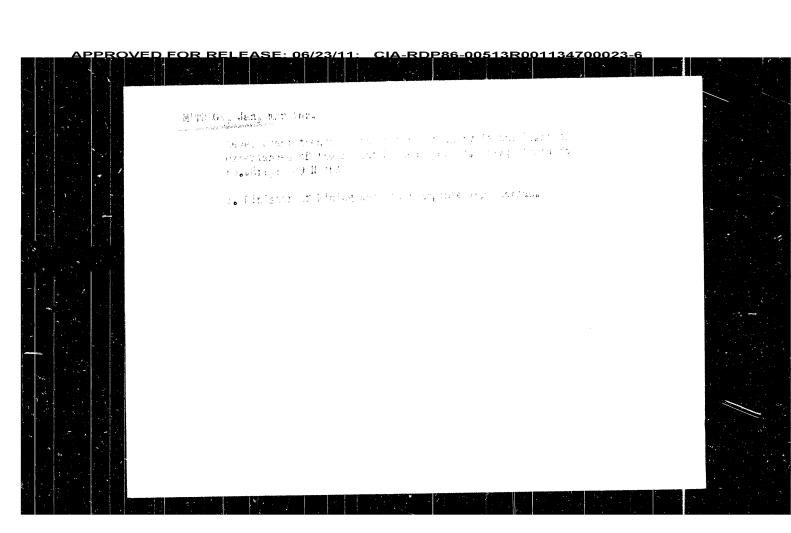
MITRENIN, B. J. 137-58-4-6980 Translation from: Referativnyy zhurnal, Metallungiya, 1958, Nr 4, p 95 (USSR) AUTHORS: Mitrenin, B.P., Burdiashvili, Sh.S., Shamba N.A., Volkov V.P., Kovyrzin, V.K., Solov'yev, L.K. Obtaining Single Crystals of Silicon by Extraction From a Melt (Polucheniye monokristallov kremniya metodom vytyagivaniya iz TITLE: rasplava) PERIODICAL: V sb.: Vopr. metallurgii i fiz. poluprovodnikov. AN SSSR 1957, pp 24-34 The possibility of obtaining large single crystals with a specified orientation from material purified by acid washing or ob-ABSTRACT: tained by reduction of SiCl4 by zinc, and the distribution of certain impurities in the extracted bar was investigated by the use of tagged atoms. The apparatus built employed high frequency heating of a base in which there was emplaced a quartz crucible containing the Si, or by means of a graphite resistance heater in the center of which, and on a quartz base, there was placed a graphite holder with the quartz crucible having the Si. A vacuum of 10-4 mm Hg was maintained in the apparatus. The crucible was free to rotate at a speed of 1 rpm, and the seed in a direc-Card 1/3

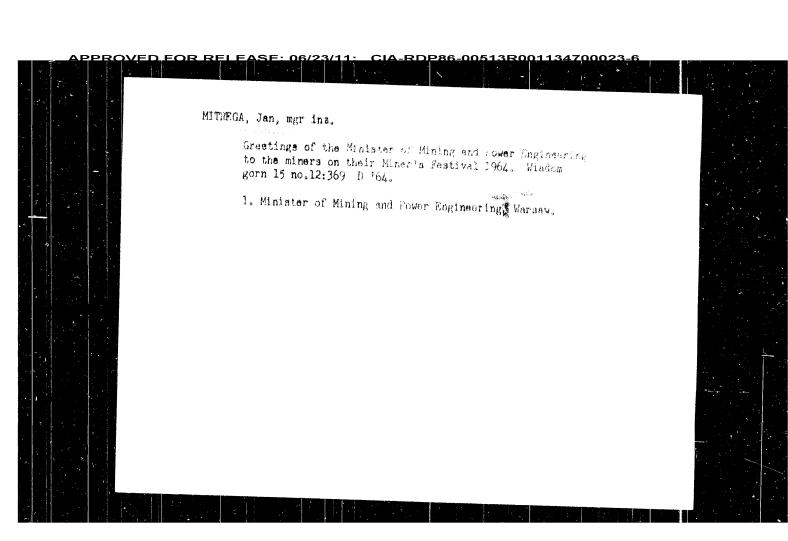


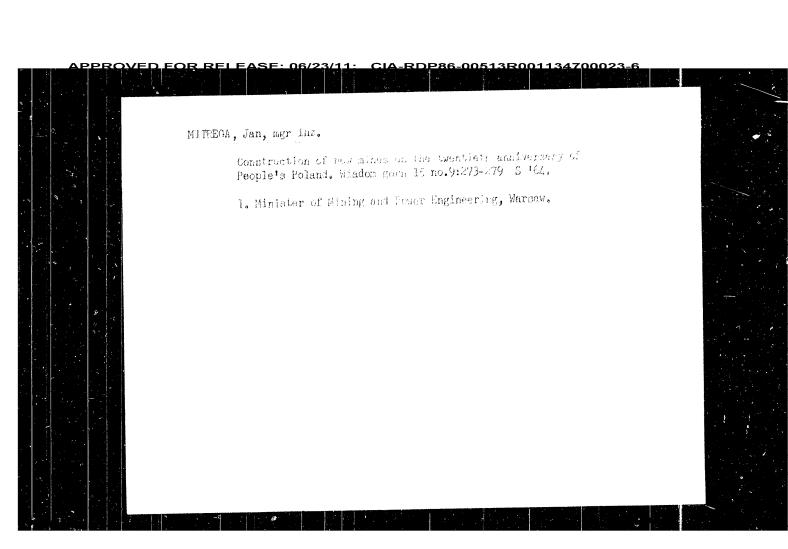


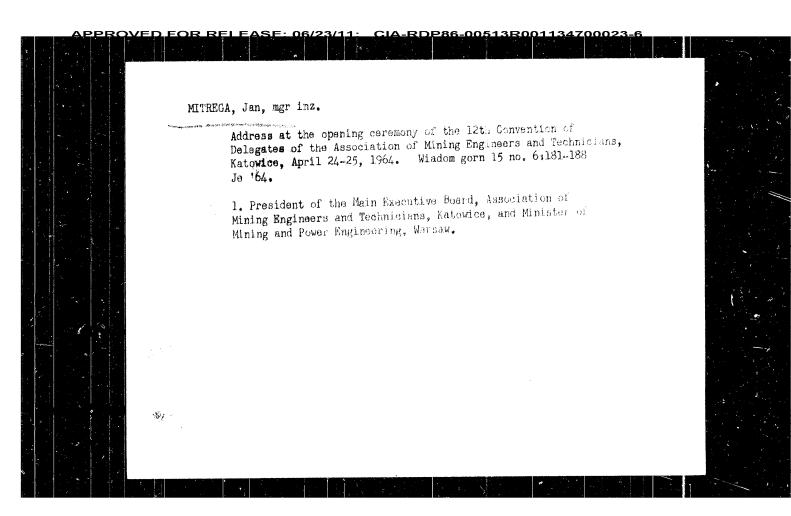


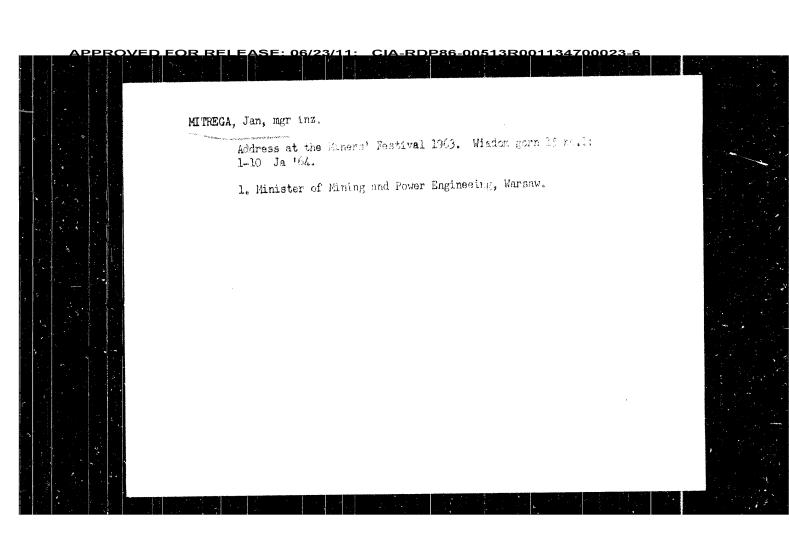


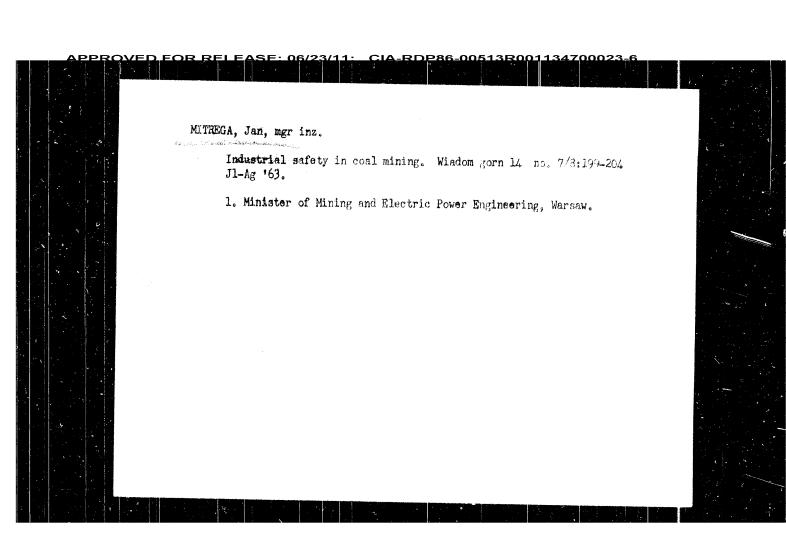


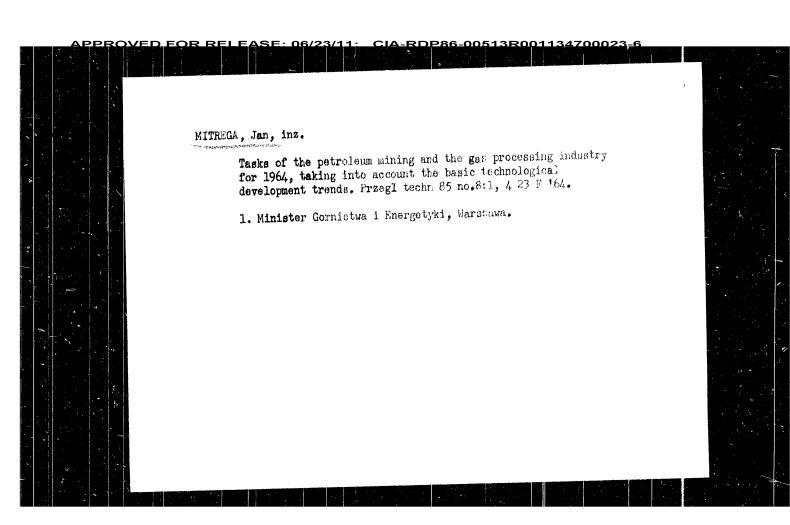


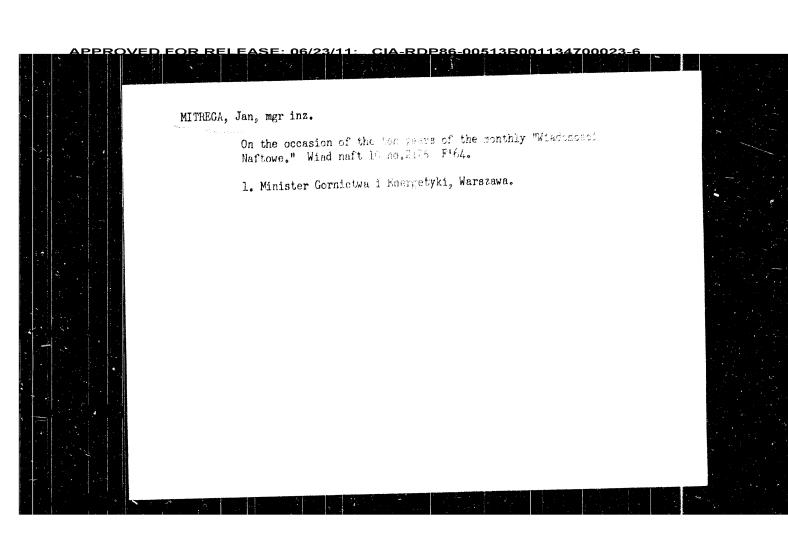


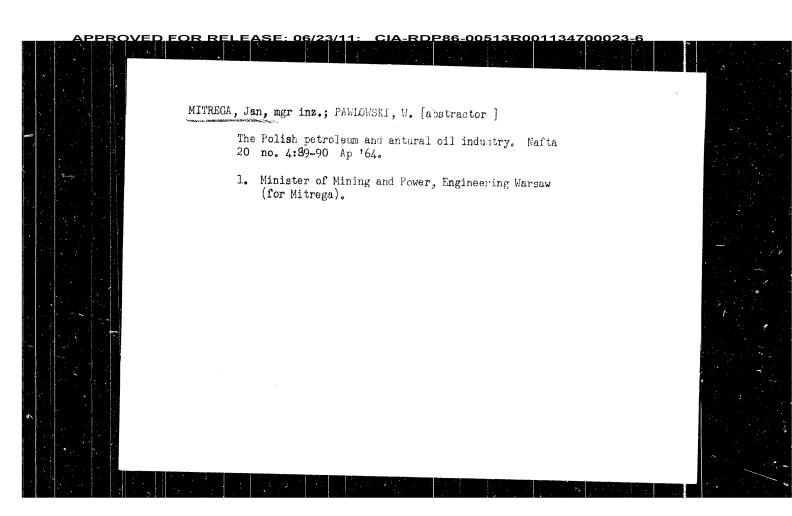


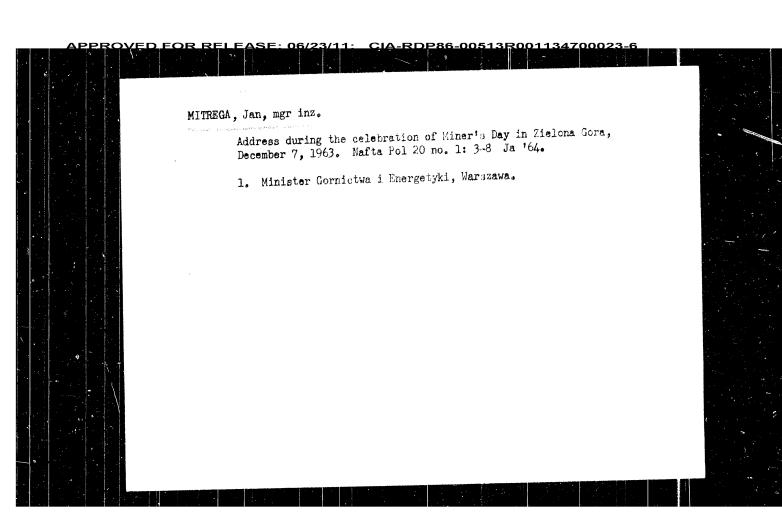


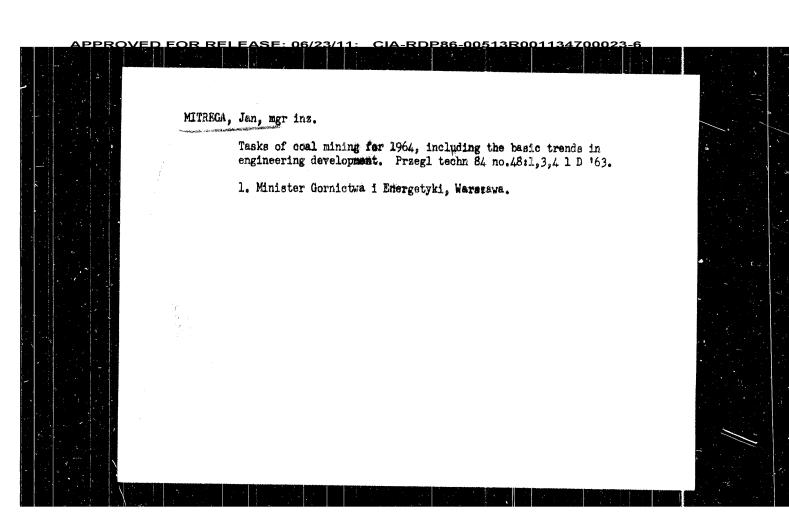


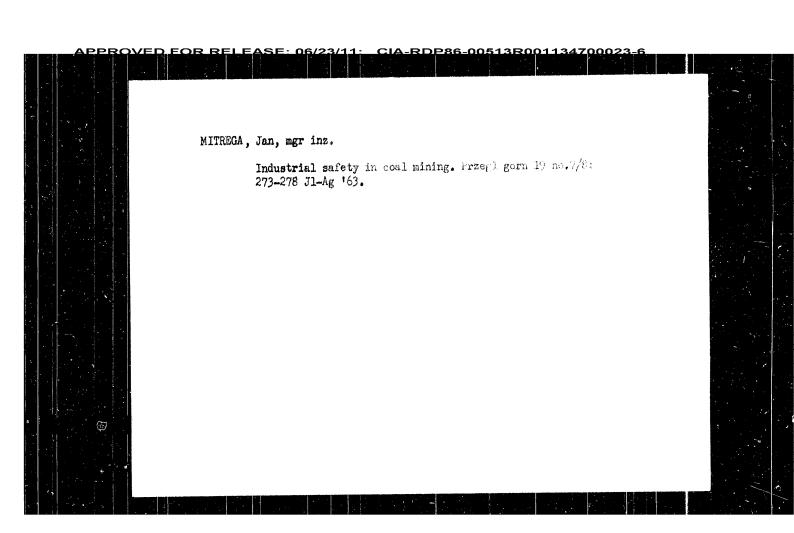


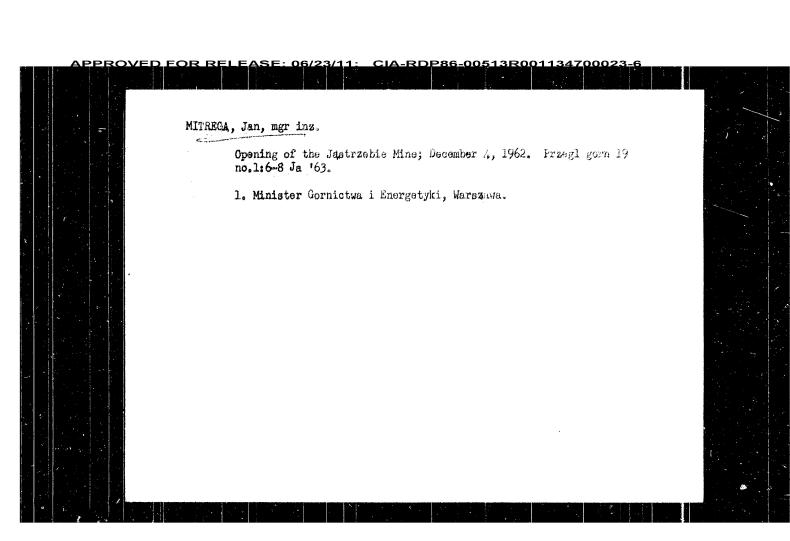


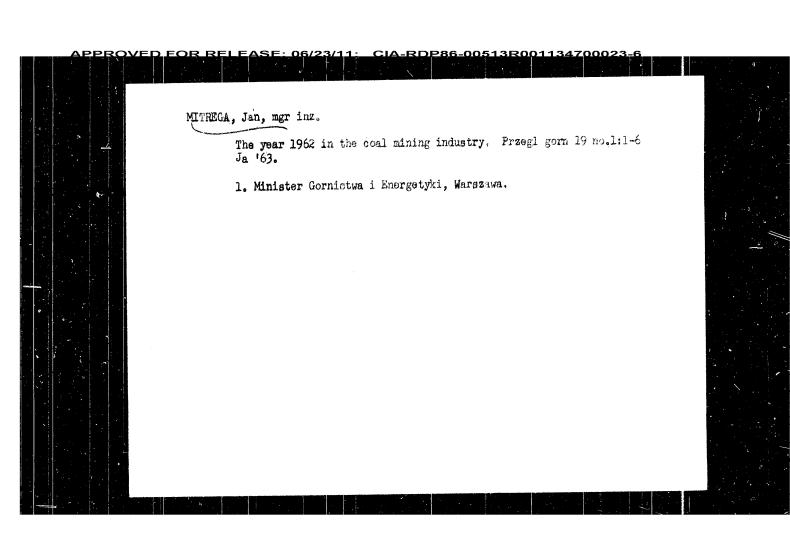


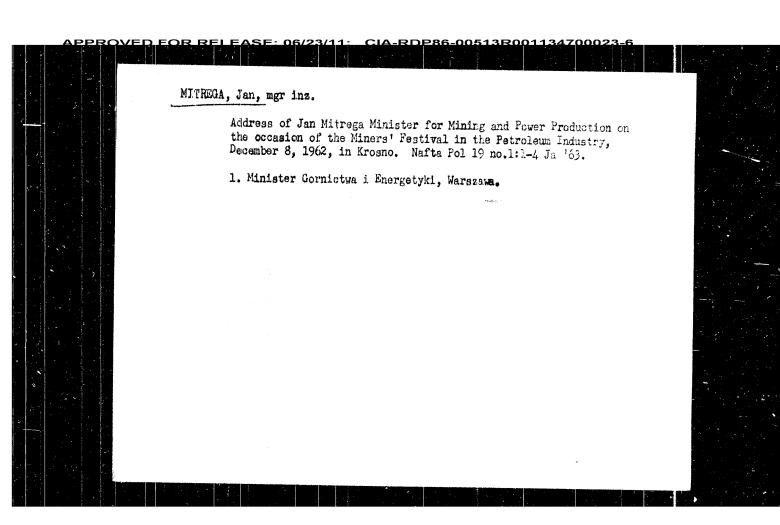


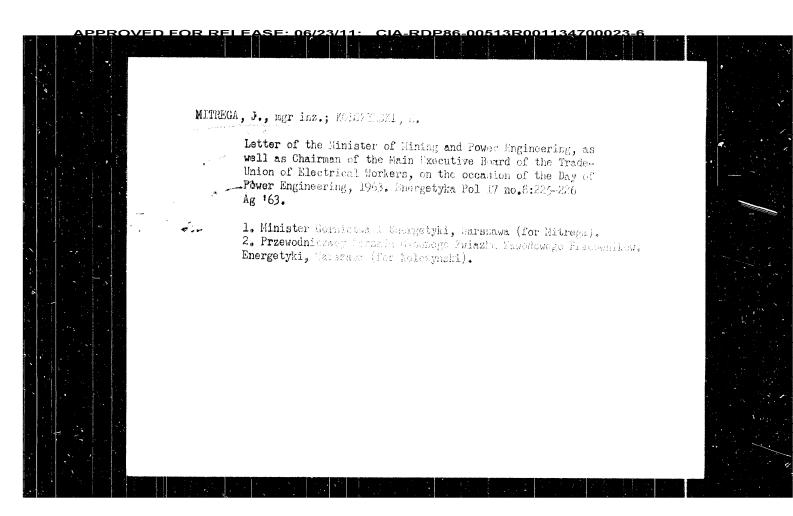


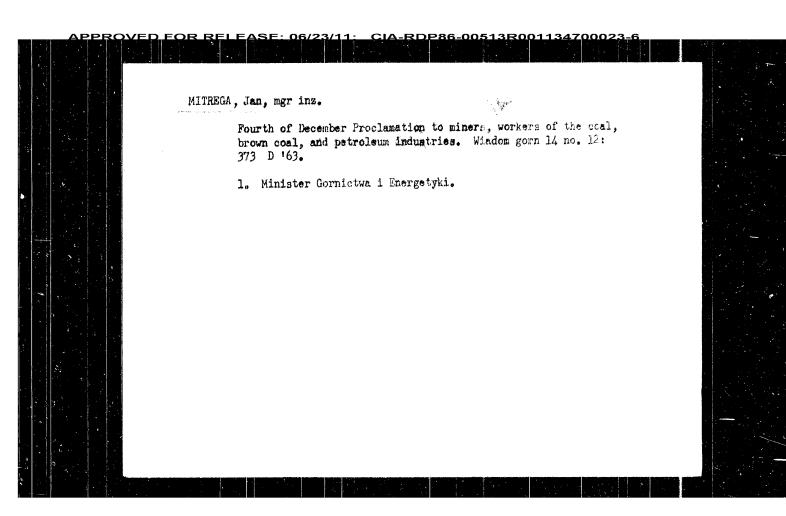


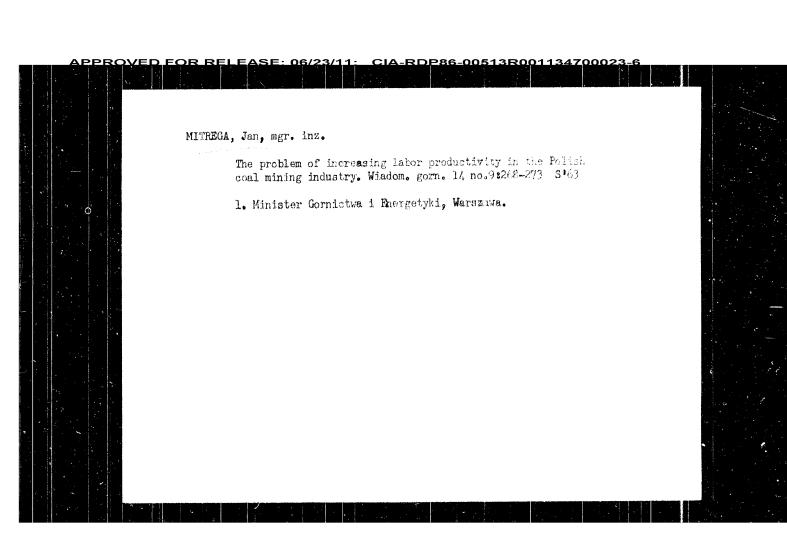


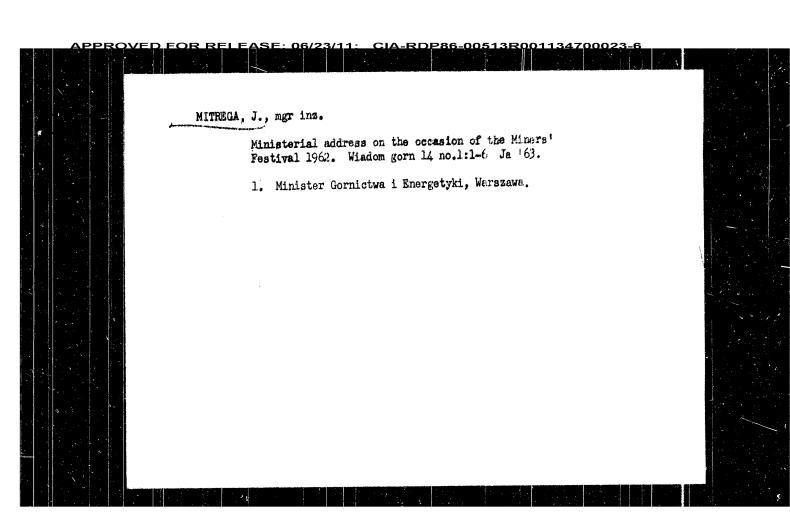


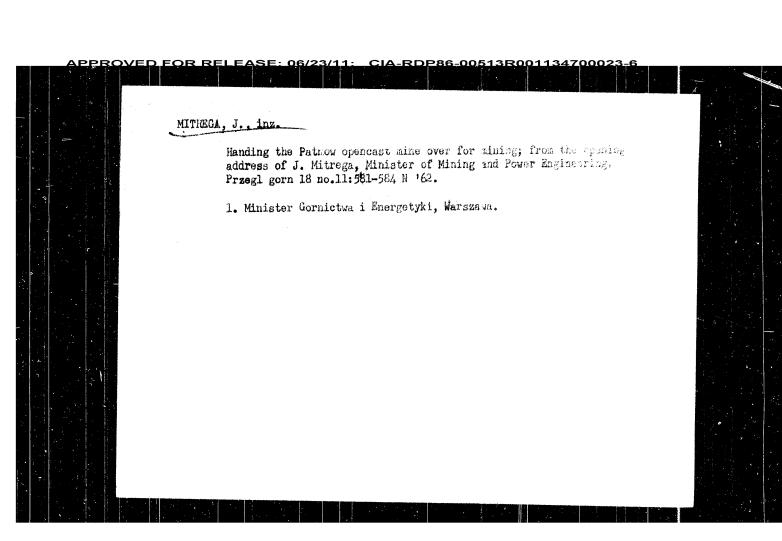












KRUPINSKI, Boleslav, prof., dr., inz.; MONNAR, J., prof., mer., inz..; MATREGA, J., inz.; RUBICZEK, Tadeusz, doc., mgr., inz.; currez, Artoni, mgr., inz.,; SMIRRUBIAK, Jen, mgr., inz.,; SKAZMSKI, Jerzy, inz.

Issure no.200 dedicated to Igmacy Lukasiavics at the 80th anniversary of his death. Nafta Pol 18 no.111-3 '62.

1. Przewodniczacy Pansiwowej Rady Gernictwa (for Krupinski).
2. Dyrektor Instytutu Naftowego, Krokow (for Wojnar).
3. Minister Gornictwa i Eneryetyki (for Mitrega). 4. Dyrektor Wydawnictwa Gornicze-Hutniczego, Krowice (for Kubiczek), 5. Naczelny Dyrektor Zjednoczenia Przemyslu Naftowego (for Crierz).

Zjednoczenia Przemyslu Naftowego (for Crierz). 6. Czlonek Komitatu do Spraw Techniki, Dyrektor Zjednoczenia Przemyslu Maszym Gorniczych (for Swierniak).

7. Dyrektor Centrali Produktow Maftowych (for Skarzynski).

